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Sedimentology of Arctic Fjords Experiment: Data Report, Volume 3

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Canadian Data Report of Hydrography and Ocean Sciences No. 54

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Canadian Data Report Of Hydrography and Ocean Sciences

These reports provide a medium for the documentation and dissemination of data in a form directly useable by the scientific and engineering communities.

Generally, the reports will contain raw and/or analyzed data but will not contain interpretations of the data. Such compilations will commonly have been prepared in support of work related to the programs and interests of the Ocean Science and Surveys (OSS) sector of the Department of Fisheries and Oceans.

Data Reports are produced regionally but are numbered and indexed nationally. Requests for individual reports will be fulfilled by the issuing establishment listed on the front cover and title page. Out of stock reports will be supplied for a fee by commercial agents.

Regional and headquarters establishments of Ocean Science and Surveys ceased publication of their various report series as of December 1981. A complete listing of these publications and the last number issued under each title are published in the *Canadian Journal of Fisheries and Aquatic Sciences*, Volume 38: Index to Publications 1981. The current series began with Report Number 1 in January 1982.

Rapport statistique canadien sur l'hydrographie et les sciences océaniques

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En général, les rapports contiennent des données brutes ou analysées mais ne fournissent pas d'interprétations des données. Ces compilations sont préparées le plus souvent à l'appui de travaux reliés aux programmes et intérêts du service des Sciences et Levés océaniques (SLO) du ministère des Pêches et des Océans.

Les rapports statistiques sont produits à l'échelon régional mais sont numérotés et placés dans l'index à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page de titre. Les rapports épuisés seront fournis contre rétribution par des agents commerciaux.

Les établissements des Sciences et Levés océaniques dans les régions et à l'administration centrale ont cessé de publier leurs diverses séries de rapports depuis décembre 1981. Vous trouverez dans l'index des publications du volume 38 du *Journal canadien des sciences halieutiques et aquatiques*, la liste de ces publications ainsi que le dernier numéro paru dans chaque catégorie. La nouvelle série a commencé avec la publication du Rapport n° 1 en janvier 1982.

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ABSTRACT

Syvitski, J.P.M. and Praeg, D.B. (Compilers) 1987. Sedimentology of Arctic Fjords Experiment: Data Report, Volume 3. Can. Data Rep. Hydrogr. Ocean Sci. 54: iv + 468 p.

This is the third data report in a series on SAFE, the Sedimentology of Arctic Fjords Experiment (Geological Survey of Canada Project #810042). Contributions from over 15 researchers are presented in 15 chapters, which include information on inter-fjord and coastal surveys, prodelta investigations, manned submersible observations, sedimentologic, geotechnical and geochemical examinations of cores, and airphoto interpretations.

RESUMÉ

Syvitski, J.P.M. and Praeg, D.B. (Compilers) 1987. Sedimentology of Arctic Fjords Experiment: Data Report, Volume 3. Can. Data Rep. Hydrogr. Ocean Sci. 54: iv + 468 p.

Ce rapport est le troisième d'une série concernant le projet SAFE, consacré à l'etude Expérimentale de la Sédimentologie des Fjords Arctiques (Commission Géologique du Canada Projet 810042). Les contributions de plus de15 chercheurs sont présentées dans les 15 chapitres du volume; elles incluent les résultats des reconnaissances des fjords internes et des littoraux, des investigations des prodeltas, observations par submersible habité, des examens sédimentologiques, géotechniques, et géochimiques des carottes, et des interpretations de photographies aériennes.

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CHAPTER 1

INTRODUCTION

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The Sedimentology of Arctic Fjords Experiment (SAFE) was initiated in 1981 by the Geological Survey of Canada as a multidisciplinary study of the past and present depositional processes affecting a series of fjords along the east coast of Baffin Island (Figure 1). Depositional processes in arctic fjords are unique, in that hinterland river discharges are usually short but intense, basin water stratification is affected by both sea ice and wind mixing, and tidewater glaciers are common. The SAFE fjords are characterized by comparatively rapid process rates, which result in detailed and interesting sedimentary records. They are therefore ideal natural sedimentologic laboratories. The key objectives of SAFE include: (1) to understand sandur development and the character of the resultant facies; (2) to understand the time-dependent influences of rivers, tides, waves, wind and deep-water renewal on fjord circulation; (3) to use the geologic record of submarine and raised-marine deposits to establish the late Quaternary history within and between fjords, and to relate past and modern sedimentation patterns. The organizational framework of SAFE addresses these objectives by co-ordinating the efforts of a multidisciplinary scientific group which includes biologists, geochemists, geographers, geophysicists, geotechnical engineers, physical and chemical oceanographers, sedimentologists and micropaleontologists.

This volume is the third in the SAFE data report series. Volume 1 [25] and volume 2 [4] dealt primarily with information collected during C.S.S. Hudson cruises 82-031 and 83-028, respectively. This volume presents data generated from a variety of sources, including additional information from cruises HU82-031 and HU83-028, samples and submersible observations from M/V PANDORA II cruise 85-062 [3], and samples and observations from land-based helicopter expeditions in 1979, 1981, 1983, 1985 and 1986.

Listed below are some scientific highlights for the various reporting years of SAFE, including the present one. Numbers in parentheses refer to the SAFE publication list attached.

1983/84

1. Placement and retrieval of the NHRI photo package at Cambridge Fiord, where the seasonal formation of the fjord-head polynya was filmed.

2. Placement of sediment traps and oceanographic moorings by long-lining with a PCSP jet ranger helicopter [21].

3. Development of a placer model that can be used to predict the deposition of heavy minerals near uplifted prodelta cliffs subjected to aeolian and wave reworking [6, 74].

4. Documentation of two distinct biosedimentological zonations on the prodelta slopes of Maktak and Itirbilung that sharply abutt; these zones relate to interchannel and channel environments that are affected by gravity flow events [21].

5. Macrobenthos sediment reworking is maximized where sedimentation is lowest in the basinal environments of the SAFE fjords [8,32].

6. Holocene sedimentation rates of 30 to 50 cm per 1000 years in the deep fjord basins compared to Pleistocene rates of greater than 400 cm per 1000 years [47, 73].

7. On-board susceptibility measurements of core material provide a rapid and efficient method for evaluating lithologic variations [65, 84].

8. An empirical relationship was found between dates determined from C^{14} on total organic matter and shell material: the latter dates are consistently younger [47, 73].

9. A bioenvironmental model has been developed, based on modern calcareous foraminifera assemblages located in SAFE fjords, to predict paleocirculation and sedimentological effects that may have occurred throughout the Quaternary [58, 88].

10. SAFE fjords with extensive sills contain the greatest accumulations of sediment and are believed to filter 90 % of the fine-grained sediment transfered from landmass to the shelf, compared to 40 % for fjords without sills [52].

11. Vertical velocities up to 37 cm s^{-1} have been calculated from the ascent rates of discrete scattering structures within the plume of a submarine spring (see 1) [14, 36, 54].

12. A seismostratigraphic model was formulated which describes one complete albeit complex glacial infilling cycle [52].

13. Bulk geotechnical properties vary with facies and the geographic location within each fjord; sediments are of medium to high plasticity, many being structurally sensitive [55, 56].

1984/85

14. Six benthos associations were observed in the 10 SAFE fjords, and based on present-day environmental factors a biostratigraphic model was developed to follow the ecological changes accompanying a glacier's retreat [50].

15. The break between calcareous and aranaceous foraminifera in raised marine sequences may provide proxy information on water depth and fresh-water inflow levels [59].

16. Massive slides have occured in Holocene sediments in five northern Baffin Island fjords, suggesting that one or a series of recent large earthquakes have occured (centered around Scott Trough) [92].

17. Debris and grain flows are as important as turbidity currents for infilling arctic fjords [60].

18. A significant volume of shoreline gravel is rafted to sea by attached algae in some SAFE fjords [11].

19. Annual push moraines have been located and identified both onshore (paleo) and offshore (modern) adjacent to Baffin tidewater glaciers [7, 49].

20. Sedimentation rates are higher between 6500 and 9500 YBP compared to periods before and after [69, 71].

21. Sediment trap experiments indicate that sedimentation resulting from ice-rafting and aeolian processes ranges up to 4 g m^{-2} day^{-1} during the freeze-up period [21].

22. SAFE fjords are each geochemically unique depending on local fluvial inputs, sediment pH/Eh conditions, and levels of organic matter; elemental distributions depend largely on lithology (which reflect the ratio of layered silicates to other detrital minerals derived from nearby provenances) and therefore processes affecting sedimentation [9, 33, 75].

23. Seiche events are important for the input of marine waters, with their associated nutrients/plankton, into the fjord-head environment [37, 97].

24. Modern (Pb^{210}) sedimentation rates in Itirbilung Fiord range from 0.1 to 3 cm a^{-1}.

25. A climate-sediment discharge model has been developed to predict total and daily bedload and suspended loads into Baffin Island fjords; the model agrees with the distribution of organic carbon content of seafloor sediments [50].

26. Fjord styles of subaqueous failures are excellent analogues for ancient fan sequences.

27. Seismostratigraphic and morphometric data support the role of the Coriolis force in shaping the sediment masses in the arctic [22].

28. A morphometric method was developed for estimating basin sediment thickness in fjords where seismic data does not exist---useful in estimating Quaternary denudation rates in remote areas.

29. Stewart Lakes were a marine fjord some 500 years ago but were cut off from the sea by Little Ice Age glacier advances---they are presently undergoing extremely high rates of sedimentation, possibly the highest in arctic Canada [53].

30. There has been a 36 times reduction in apparent erosion/sediment transport capacity for the Cambridge Fiord delta during the period 4700 YBP to present compared to the Hypsithermal period of deglaciation (6000 to 4700 YBP) [20, 93].

31. Based on an interval of absent of wave-storm ridges at the head of Cambridge Fiord, it is speculated that between 1700 and 3000 YBP Cambridge Fiord (and possibly other nearby fjords) had a permanent sea ice cover [20, 93].

1985/86

32. Frontal dynamics of "maritime" glaciers, whether subaerial or submarine, may be modeled so as to predict the formation of push moraines and ice-contact fans [49].

33. The magnetic susceptibility of Late Quaternary fjord and shelf sediment of eastern Baffin Island is directly influenced by a sediment source function and the particular style of progradation [46].

34. There is a small but significant influx of detrital carbonate into the fjords of Baffin Island @ 4 ka which may reflect increased iceberg rafting from NW Greenland and/or increased resuspension of carbonate-rich shelf sediments [69].

35. The upper portion of the water column (< 100 m) in the Baffin Island fjords is subject to important short-period variations (hrs-days) that appear wind-induced, with maximum amplitudes in the water structure found at the fjord-heads [97].

36. The very sudden increase in ice-rafting indicators at 6100 BP in Clark Fiord may indicate the return to the present-day pattern of sea-ice break up in the fjord and along the outer coast, allowing icebergs to enter the fjord [82].

37. Although each Baffin Island fjord has a unique microfaunal assemblage, key environmental factors have been found to explain the major variations; the unique shallow vs. deep water populations of arenaceous and calcareous foraminifera will allow down-core microfaunal trends to be used in the understanding of mass flow processes that dominate these fjords [59].

38. The sediment dynamics associated with a slowly retreating (partially-pinned) tidewater glacier at the head of Coronation Fiord have been described and modelled [94].

39. Important geophysical targets were ground-truthed by submersible sampling and observations, including details on frontal dump and medial moraines, till tongues, slope failure deposits and bedrock features [3, 90, 96].

40. Slope stability experiments on prodelta environments include the initiation and filming of turbidity current events [96].

41. The diversity and density of macrobenthos in the SAFE fjords can be related to water properties, bottom energy and seafloor type [96].

42. Six sandur deposits were stratigraphically mapped using facies analysis--- a dynamic facies model was subsequently formulated [93].

43. Sediment dynamics within nivation hollows was documented.

44. One of Canada's largest Tertiary-Quaternary deltas (Cape Aston) was recognized as having similarities to the Mackenzie delta and to Sable Island [93].

45. Data from helicopter-emplaced oceanographic moorings and weather stations indicate the presence of storm-induced seiches in fjords and 9 turbidity current events on the prodelta slopes of Ititrbilung Fiord, within in a five week period. Detailed analysis of the gravity flow events has revealed two types of events: (1) powerful single events may indicate delta front failure of coarse-grained sediment, and (2) weaker multi-events may indicate retrogressive slide failure of the prodelta muds [this volume, Ch. 6].

46. Many raised marine sections contained evidence of internal failure, possibly seismically induced [92].

1986/87

47. p-wave velocities measured on Baffin cores ranged from 1024 to 2493 m s^{-1} [this volume, Ch. 10].

48. Aeolian transport in arctic fjord valleys occurs principally in winter; the final deposit is controlled by surface roughness, topography and vegetation cover and is reworked year round [77].

49. Studies of 21 Baffin glaciers show most having retreat rates between 3 and 50 m a^{-1}, with only two tidewater ice front advances found ($\approx$11 m a^{-1}) [this volume, Ch. 14].

50. A first-order box model was developed to estimate the sedimentation rates within Coronation Fiord: 100 mm a^{-1} at 1 km from the ice front to 0.7 mm a^{-1} at 30 km [96].

51. Whales and seals rework the seafloor of Baffin Island fjords, even to depths of 350 m [65].

52. Carbon is an excellent proxy (inverse) indicator of sedimentation rates in Baffin Island cores: a hypothesis that is consistent with the Neoglacial interval being a period of low denudation rates.

53. A land-sea map series has been initiated to relate the onshore Quaternary depositional setting to that found within the Baffin fjords [110].

54. The glacial rivers of Baffin Island are very turbid (up to 2 kg m^{-3}) except where they are filtered by coastal lakes [this volume, Ch. 4].

55. Baffin Island fjord sediments are more enriched in ^{15}N than Mid-Atlantic coast shelf sediments, a difference that may reflect extensive fertilizer input to the ocean along the Mid-Atlantic seaboard [64, 66].

56. McBeth Fiord is dominated by hemipelagic deposition and has a smooth muddy prodelta, whereas Itirbilung is dominated by mass-flow processes and has a variety of sediment failure and resedimentation features [80].

This open file is planned to be the last major SAFE data report. The publication of SAFE manuscripts will continue. Attached is the most up-to-date (April 1, 1987) SAFE reference list. We thank all the contributors of this report, and wish all SAFE participants success in their endeavors to write up and publish their manuscript contributions. We also thank the various national and international agencies and institutes who have supported SAFE logistics and personnel.

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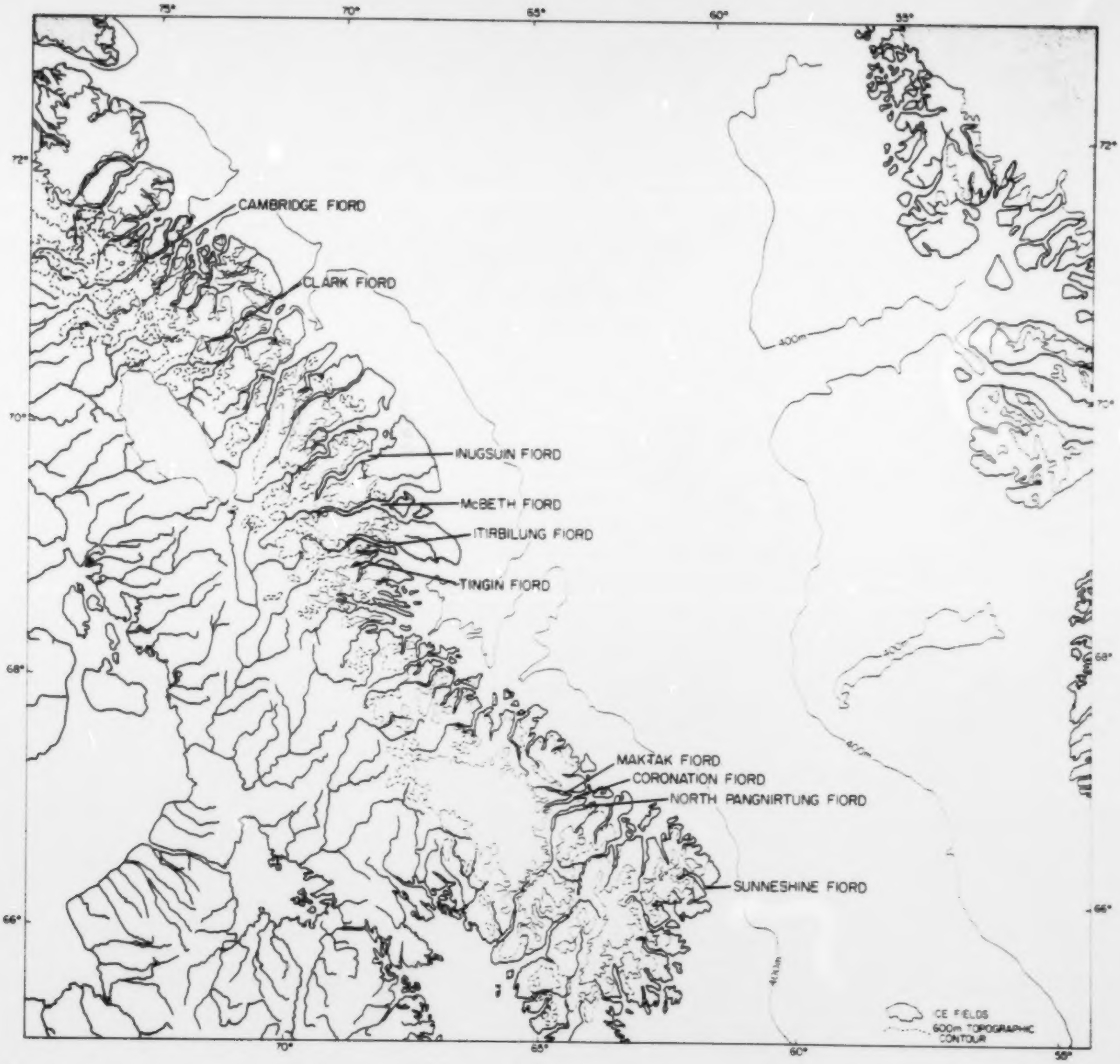
75°
70°
65°
60°
55°
72°
70°
68°
66°
CAMBRIDGE FIORD
CLARK FIORD
INUGSUIN FIORD
McBETH FIORD
ITIRBILUNG FIORD
TINGIN FIORD
MAKTAK FIORD
CORONATION FIORD
NORTH PANGNIRTUNG FIORD
SUNNESHINE FIORD
400m
400m
400m
ICE FIELDS
600m TOPOGRAPHIC CONTOUR
70°
65°
60°
55°

Figure 1

LATE QUATERNARY GLACIAL AND RAISED MARINE STRATIGRAPHY OF NORTHERN BAFFIN ISLAND FIORDS

Jay A. Stravers

INTRODUCTION

This report describes 84 onshore sample localities from glacial and isostatically raised marine sections of northernmost Baffin Island. The majority of sample sites occur along the shores and formerly submerged valleys of Cambridge Fiord, Buchan Gulf, Tay Sound, Paquet Bay, the Coutts Inlet system, and the foreland areas beyond the mouth of Coutts Inlet (see Figures 1 and 2). The primary objectives of the field and laboratory studies presented here are three fold. 1: To correlate the onshore glacial and marine stratigraphy to offshore seismostratigraphic records obtained for the Cambridge Fiord basin (Gilbert and MacLean, 1983) 2: To examine the raised marine stratigraphic sections in an attempt to determine the nature of the correlative offshore glacimarine units identified on the seismic records, 3: develop a radiocarbon chronology of glacial events that could be applied to the offshore basin sections that were too deep to be reached by piston core.

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METHODS

A detailed glacial and surficial deposits map was produced from analysis of air photographs. Sample localities were chosen on the basis of their relationship to the regional glacial geology and their potential for providing dateable materials that could be used to develop a chronology of glacial events. Stratigraphic sections were described and measured in detail and most sample localities were documented on photographs. Radiocarbon assays were obtained from 15 samples submitted to the Geological Survey of Canada Radiocarbon Lab and to Beta Analytic Inc. Radiocarbon Lab.

Size frequency distributions were determined for 70 samples by Donald Clattenburg in the AGC sedimentology laboratory. The gravel fraction distribution was determined a 1/2 phi intervals by standard sieving. The sand fraction was analyzed at 1/5 phi intervals for its equivalent spherical sedimentation diameter using the A.G.C. settling tube. The mud fraction, when greater than 10% by weight, was analyzed on the Sedigraph 5000D at 1/5 phi intervals for the particles equivalent spherical sedimentation diameter.

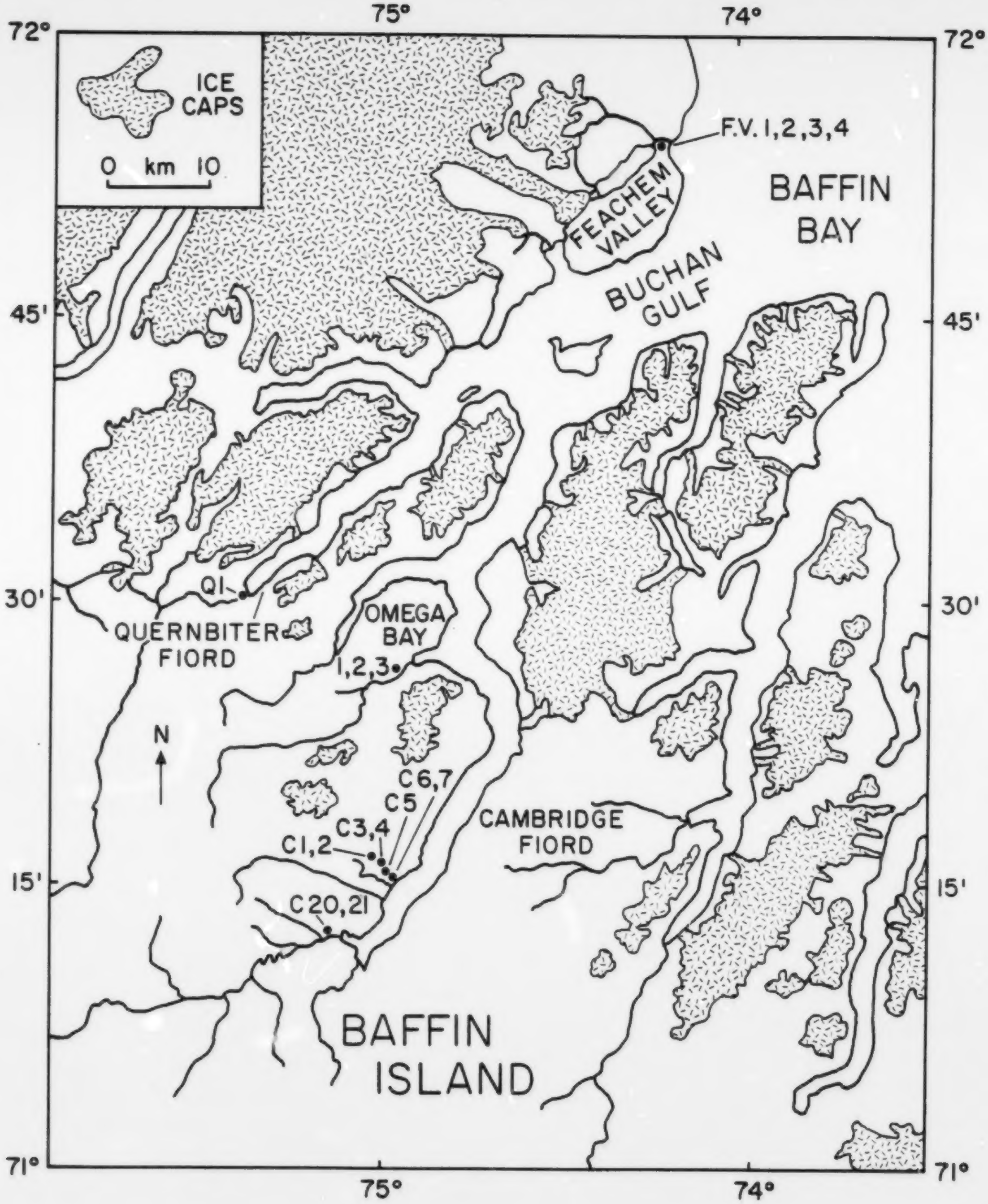
72°
75°
74°
72°
ICE CAPS
0 km 10
F.V. 1,2,3,4
FEACHEM VALLEY
BAFFIN BAY
BUCHAN GULF
45'
45'
Q1
30'
30'
QUERNBITER FIORD
OMEGA BAY
1,2,3
N
C6,7
C5
C3,4
C1,2
CAMBRIDGE FIORD
15'
15'
C20,21
BAFFIN ISLAND
71°
75°
74°
71°

Figure 1 Map of sample localities within Cambridge Fiord and outer Buchan Gulf.

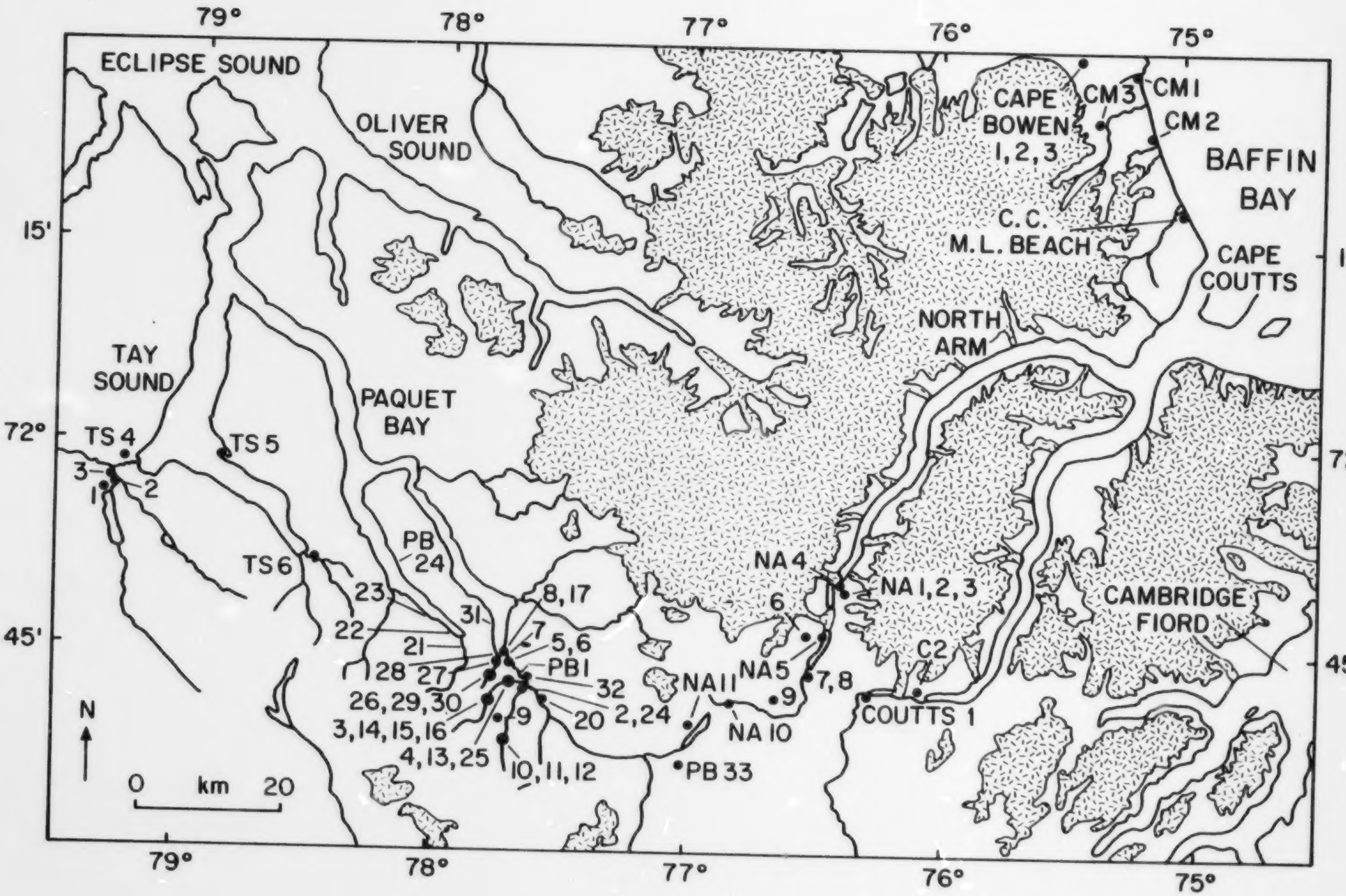
79°
78°
77°
76°
75°
15'
72°
45'
ECLIPSE SOUND
OLIVER SOUND
TAY SOUND
PAQUET BAY
BAFFIN BAY
CAPE BOWEN 1,2,3
CM3
CM1
CM2
C.C. M.L. BEACH
CAPE COUTTS
NORTH ARM
CAMBRIDGE FIORD
TS 4
TS 5
TS 6
3
1
2
PB 24
23
22
21
28
27
31
8,17
7
5,6
PB1
32
2,24
20
26,29,30
3,14,15,16
4,13,25
9
10,11,12
NA11
NA10
PB 33
NA5
9
7,8
6
NA4
NA1,2,3
C2
COUTTS 1
N
0 km 20

Figure 2 Map of Sample Localities from the Paquet Bay and Coutts Inlet area.

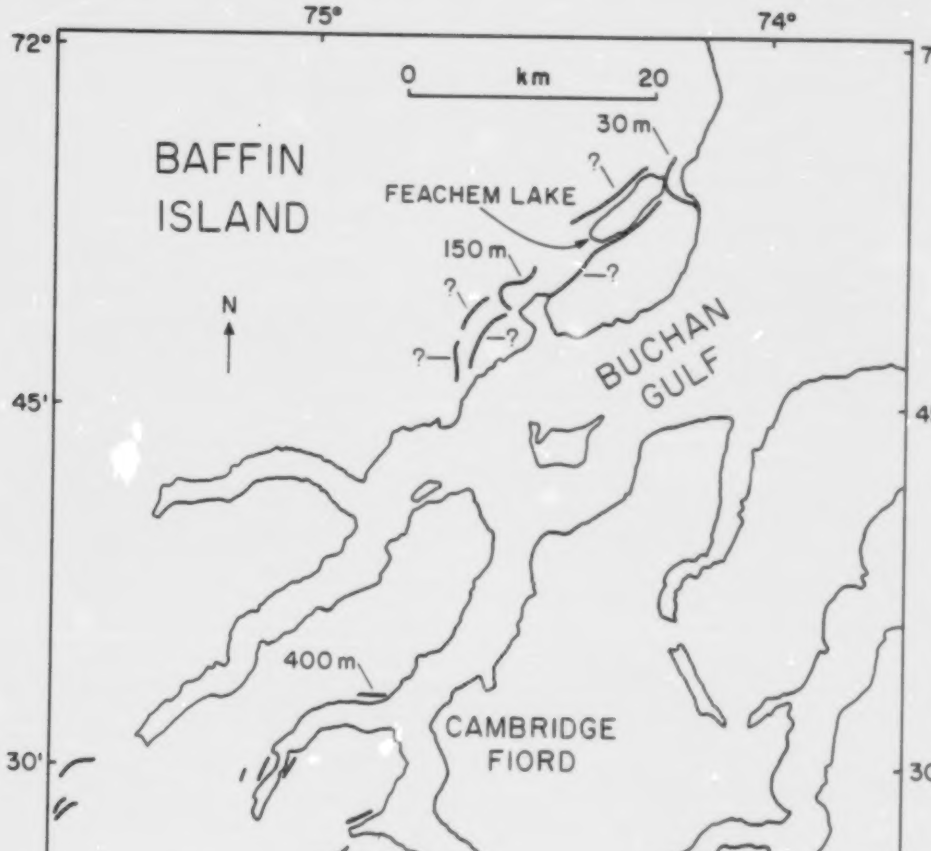
75°
74°
72°
45'
30'
15'
71°
0 km 20
BAFFIN ISLAND
FEACHEM LAKE
30 m
150 m
?
N
BUCHAN GULF
400 m
CAMBRIDGE FIORD
500 m
750
750 m

Figure 3 Map of "Cockburn" moraines and ice contact drift of inner Cambridge Fiord and moraines distal to the "Cockburn" moraine system which exhibit similar weathering characteristics (Cambridge moraines). Note that older more highly weathered moraines (pre-Holocene or pre-late Foxe) are not included on this map.

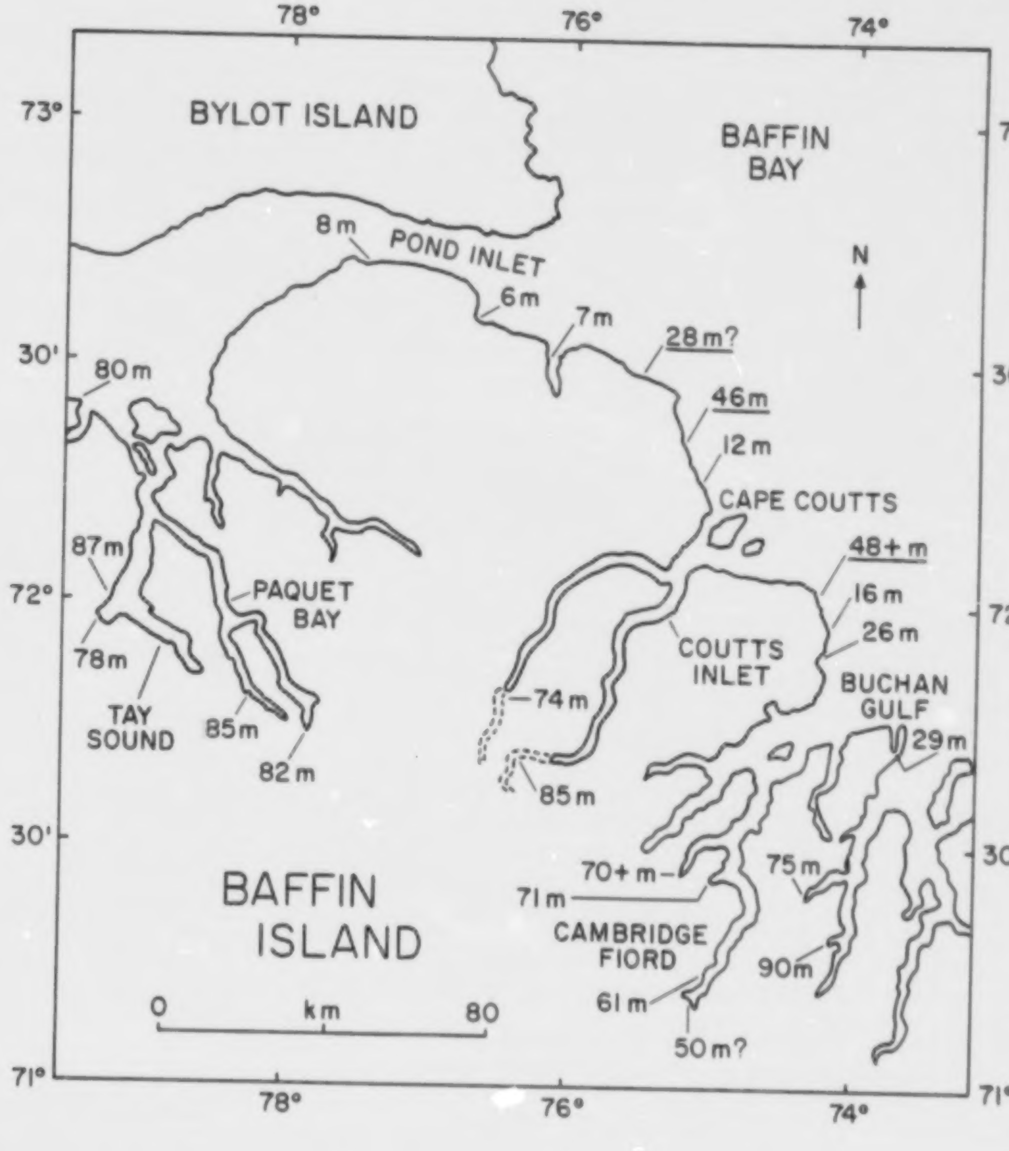
78°
76°
74°
73°
30'
72°
71°
BYLOT ISLAND
BAFFIN BAY
N
POND INLET
8m
6m
7m
28m?
46m
12m
80m
CAPE COUTTS
48+m
16m
26m
87m
PAQUET BAY
78m
TAY SOUND
85m
82m
COUTTS INLET
74m
85m
BUCHAN GULF
29m
70+m
71m
75m
CAMBRIDGE FIORD
90m
61m
50m?
BAFFIN ISLAND
0
km
80

Figure 4 Map of the marine limits (in meters) of northern Baffin Island. The underlined values indicate the elevation of pre-Holocene or pre-late Foxe marine limits.

RADIOCARBON SAMPLES

The radiocarbon determinations on marine mollusc shells were obtained from 2 laboratories which report radiocarbon age relative to different standards. Beta reports shell dates relative to the wood standard of Del ^{13}C = -25o/oo PDB while GSC normalizes shell dates to 0.0 o/oo PDB. Therefore in order to insure intralab compatibility it is necessary to standardize all reported radiocarbon dates. This proceedure is particularly necessary when dealing with a high resolution radiocarbon chronology for early Holocene glacial events. The method for recalculating the radiocarbon age of shells generally involves a normalization of the date to -25o/oo and the subtraction of a specific number of years for the reservoir effect of "old" seawater. Due to the uncertainty of the reservoir factor in Baffin Bay I have chosen to simply standardize the dates to 0.0o/oo PDB rather than -25o/oo. This automatically provides a reservoir correction of 410 years which is probably a reasonable estimate in light of data presented by Mangerud (1972).

SAMPLE LOCALITY	RADIOCARBON LAB. ID. #	UNCORRECTED OR REPORTED DATE	STANDARDIZED DATE
Cambridge 6	Beta-20728	6040±100	5620±100
Cambridge 7	Beta-20729	4300±80	3890±80
Cambridge 20	Beta-16492	4000±70	3590±70
Omega Bay 1	Beta-20726	8260±150	7840±150
Omega Bay 2	Beta-20727	9010±120	8600±120
Feachem Valley 2	GSC-4357	8130±110	8130±110
Feachem Valley 4a	GSC-4366	7310±70	7310±70
Feachem Valley 4b	Beta-20730	6150±130	5730±130
North Arm 1	Beta-20724	6990±110	6580±110
North Arm 2	Beta-20725	7140±90	6730±90
Tay Sound 2	GSC-4317	6990±90	7010±90
Paquet Bay 8	GSC-4379	4850±70	4850±70
Paquet Bay 8	Beta-19588	5070±90	4660±90
Cape Coutts 10m	Beta-20731		5770±80
Cape Bowen	Beta-16487	26130±300	Amino Acid
17Aug85		Hiatella arctica	0.22± free
			0.036± total

GLACIAL AND RAISED MARINE DEPOSITS OF THE CAMBRIDGE FIORD SYSTEM

The samples were collected from isostatically raised marine sections along the shores of inner Cambridge Fiord (Figure 1), Omega Bay, Feachem Valley (informal), and the western coastal area of outer Buchan Gulf. Morainal sequences and ice contact deposits were sampled and described along the western valley wall of inner Cambridge Fiord as well.

Moraine Systems of Cambridge Fiord

An important feature of the Cambridge Fiord glacial sequence is that disjunct moraine segments bearing identical weathering characteristics to the "Cockburn" (Andrews and Ives, 1978) moraines of inner Cambridge, can be traced along the middle and outer reaches of the fiord (Figure 3). I interpret the trend of these moraines (here referred to as the Cambridge moraines) as marking a shallow gradient outlet glacier which terminated within outer Buchan Gulf. Reconstructed ice surface elevations trend from 500m at the inner fiord to 450-400m near Omega Bay, 150m at Feachem Bay, and finally intersect the marine limit at about 30m in outer Feachem Valley. A clearly defined weathering break developed in morainal deposits can be mapped along inner Cambridge Fiord. The Cambridge moraines show little evidence of post depositional modification by weathering. They display fresh, stable surface morphologies, very limited soil development, and show no evidence for cryoturbation. In marked contrast, the glacial deposits above the weathering break show very degraded and indistinct morainal morphologies. They have been subjected to extensive cryoturbation and much of the apparent morainal form is due to solifluction.

The majority of the marine sections examined were found to be fossiliferous and thus were sampled for radiocarbon analysis. A tentative glacial reconstruction can be outlined from the dates reported here as well as those from the reconnaissance field studies conducted by Hodgson and Haselton (1974). The glacial and marine deposits within Cambridge Fiord and Omega Bay are related to the early to mid-Holocene retreat of an outlet glacier that occupied the fiord. The outermost morainal or glacimarine deposits of the Cambridge moraines have been identified at Feachem Valley (site F.V.2 along coast of Buchan Gulf), where they dammed Feachem Lake (informal). The outlet glacier must have terminated in the vicinity of outer Buchan Gulf because here, the moraines are observed to intersect and underlie marine deposits of the marine limit phase. These moraines pre-date 8600±120 (Beta-20727, Omega Bay 2) which marks the initial deglaciation of the Cambridge Fiord outlet glacier. The glacimarine facies of the Feachem Valley sequence (F.V.2) date from 8130±110 (GSC-4357) and they indicate glacial input to the Buchan Gulf system from a major readvance occurring just prior to 7840±150 (Beta-20726, Omega 1).

Holocene Marine Limits and Pre-late Foxe Marine Deposits:

North of Feachem Valley, along the Baffin Bay coast, the Holocene marine limit is marked by prominent raised beaches that have been superimposed on, or eroded into older deltaic deposits. The elevation of the marine limit berm ridges declines northward apparently in a direction away from the axis of Buchan Gulf (Figure 4). The highest Holocene marine limits along the outer coast are observed at Feachem Valley (30m). Northward, they decline to 16m in the Cape Jameson area, 12m near the mouth of Coutts Inlet, and 6 to 8m along the northernmost coast of Baffin Island. The marine limit may be expected to be isochronous along the outer coast because it remained ice free for the entire late Foxe and early Holocene interval (excepting the Feachem Valley sites).

Therefore, the regional trend of the data suggest a significant ice load in Buchan Gulf.

SAMPLE SITES AND LOCALITY DESCRIPTIONS:

INNER CAMBRIDGE TRAVERSE SUMMARY: (for Cambridge Sites 1 - 7)

- Pre late Foxe moraines at 405m and 507m
  Lower moraine appears to have soliflucted over late Foxe or early Holocene moraines
- Prominent Kame terrace level 278m
- Prominent recessional moraine 219m
- 1st water washed feature 171m (ice marginal drainage)
- Prominent slope break suggesting wave action??? or water washing perhaps by ice marginal stream 122m
- Prominent wave washing limit 61m
- constructional features (genesis unknown) 46-51m, possibly a wave modified moraine
- Most prominent marine constructional feature 30-34m
  6330±140 (GSC-1094)
- Upper surface (slope break) of C6 and C7 outcrop 18-22m
- C7 fossiliferous sands 12m 3890±80 (Beta-20729)
- C6 fossiliferous marine stoney muds 8m
  5630±100 (Beta-20728)
- M.H.T. (mean high tide)

Cambridge 1 Moraines above the main kame terrace level in Cambridge
Cambridge 2 fiord.
UTMG 18W VQ 4995E 79085N
Date 1Aug86
Elev. 405m and 507m
Sed. Sample: 1 - Till sample from C horizon of soil pit at C1 (405m).
2 - Till sample from C horizon of soil pit at C2 (507m)

Comments:
Both sites are on moraine crests above the main kame terrace level. These sites appear to be the most stable of any of the higher moraine sites in this area however they do show clear evidence of solifluction with down slope mass movement having masked younger morainal deposits. Soil pits at both sites show thin A horizons over diffuse cambic B horizons of 6 and 8cm. Boulder armouring is common on almost all of the higher "moraines" and it appears that much of the moraine like forms of these deposits is due to solifluction rather than a glacial depositional process. The armouring is probably due to two factors including frost heave which brings the larger clasts to the surface and deflation which removes the interstitial fines. Because of these factors I would consider relative weathering to be unreliable at these sites.

Cambridge 3 Prominent kame terrace and moraine segment along inner Cambridge fiord.
UTMG 18W VQ
Date 1A86
Elev. 278m
Sed. Sample: 1 - Till sample from C horizon in soil pit on flat, stable, well drained surface of terrace.
2 - Sample from the B horizon of the same soil pit.

Comments:
Soil pit shows well formed horizonation with a 7cm dark cambic B horizon. This kame terrace shows a very fresh, stable morphology of "Cockburn" or late Foxe age. There is no evidence of solifluction or cryoturbation as in the higher deposits. It may not however represent the late Foxe maximum ice extent because there is no clear weathering break associated with a specific ice marginal feature between this deposit and the moraine sites at C1 and C2. There are however higher deposits (to 500m) of similar morphology in the adjacent valley to the southwest. Here at site Cambridge 3 there is an irregular slope that may have been washed by ice marginal drainage but the slope is unstable and its true genesis is unknown.

Cambridge 4 Stream cut into stratified sands of the kame terrace.
UTMG 18W WQ 5002E 79075N
Date 1A86
Elev. 280m=surface of terrace
Sed. Samples: 1 - well sorted sands from 6m below the surface of the terrace
2 - coarse poorly sorted layer interbeded with the sands.

Comments:
Stream cut exposes 8m of well sorted poorly stratified sands interbedded with coarse sands layers within the kame terrace. The deposition of the coarse beds have caused considerable deformation of the underlying sediments indicating the sands were water saturated at the time of deposition. In the adjacent valley to the SW there are similar kame terrace features that occur at higher elevations. These must relate to the same ice surface and thus should provide reasonable data on the ice surface gradient.

Cambridge 5 The prominent lateral moraine below the kame terrace.
UTMG 18W VQ 4999E 79065N
Date 1A86
Elev. 219m
Sed. Sample: 1 - sample from B soil horizon at 7-10cm depth below surface.

2 - sample from Cn soil horizon at 35cm depth below surface.

Comments:
Soil pit excavated in moraine crest shows a 2cm A over a 10cm thick cambic B horizon over Cn. The sample site is on a slight slope therefore the B horizon may be augmented. note; some B horizon was inadvertently mixed into the C horizon sample so it may not show a true C color. The interpretation is that this moraine represents a major stillstand during early Holocene retreat and general ice surface lowering.

Cambridge 6 Outcrop of fossiliferous stoney muds along stream above shoreline.

UTMG 18W WQ 5010E 79060N
Date 1A86
Elev. 8m
R.S.L. sub-littoral muds
M.L. 61m
Sed. Sample: 1 - sample of stoney mud
Shell Sample: 1 - whole valves and valve fragments of Macoma calcarea, Mya truncata, and Hiatella arctica excavated from stoney mud or collected from float on the outcrop.

Comments:
Stratigraphic section consists of 4m of stoney muds (cropping out above the stream bed) overlain by 6m of presumably deltaic sands. The muds may represent an ice-proximal sediment deposited during deglaciation. The surface above the outcrop slopes from 18m to 22m however it is an irregular surface that may be erosional in nature rather than indicating any specific sealevel feature. The most prominent marine constructional feature or terrace above this site lies at 30-34m.

Cambridge 7 Marine sands overlying the stoney muds of C6

UTMG 18W WQ 5010E 79060N
Date 1A86
Elev. 12m
R.S.L. 18-22m? see note
M.L. 61m
Sed. Sample: 1 - sample of fossiliferous sands
Shell Sample: 1 - valve fragments with a few whole valves of Mya truncata and one large whole valve of clinocardium. Collected from float on outcrop.

Comments:
Stratigraphic section consists of 4m of stoney muds (C6) overlain by 6m of deltaic sands which contain scattered large clasts. It is not clear whether the clasts are coming from eroded topset beds or are scattered throughout the sands. The surface above the outcrop slopes from 18m to 22m however it is an irregular steeply sloping surface that may be erosional in nature rather than indicating any specific sealevel feature. The most prominent marine constructional feature or terrace above this

site lies at 30-34m so it is difficult to tell if deposit relates to an 18-22m sealevel or a 30-34m level. If this sample is dated it could be compared to the 4000 date at 12m on the Keel river to reasonably determine which of the terrace levels it relates to.

Cambridge 20 and 21
12m fossiliferous delta site dated at 3590±70 Beta-16492
UTMG 18W VQ 4920E 79002N
Date 8A86
Elev. Ca20 6m
Ca21 9m
Terrace Elev. 12
R.S.L. 10-12m
M.L.
Sed. Samples: 1 - Ca20; fossiliferous muddy sands from delta foreset beds exposed along major river cut.
2 - Ca20; well sorted sands from just below sample 1 of Ca20.
Shell Samples: 1 - Ca20 Large in situ paired valves of Mya psuedoarenaria from delta foresets.
2 - Ca21 in situ paired valves of H. arctic, Mya truncata, Mytilus edulis, and Serripes groenlandicus from foreset beds overlying Ca20.
T.L. Samples: 1 - Ca20 shell M.S.; from main shell bearing muddy sands.
2 - Ca20 w S.S.; from well sorted sands just below sample 1 of Ca 20.

Comments:

Outcrop consists of 10m of deltaic foreset and topset beds exposed along major river cut. Base of outcrop or stream level = 2maht. Note that only 3m of section separate cambridge 20 and 21 in the same outcrop yet they contain completely different faunas.

Omega Bay 1
Omega Bay 2
Omega Bay 3
Main stratigraphic section underlying the 50m terrace
UTMG 18W WQ 5015E 79266N
Date 1A86
Elev. OB1 53m
OB2 47m
OB3 45m
R.S.L. OB1 71m?=delta surface
OB2 sub-littoral marine mud
OB3 same as OB2
Shell Samples: 1 - OB1; valve fragments of Mya truncata and H. arctica collected from float of delta foreset beds. (collected over 3m interval)
2 - OB2; in situ paired valves of Hiatella arctica excavated from outcrop or collected from thin float veneer. From flat lying muds directly overlying diamict and underlying

foreset beds. (collected over 2m interval)
3 - OB3; small collection made at essentially the same site as OB2 but containing sample of other species present.

Comments:
The total stratigraphic section exposed here is about 44m. The base of the section consists of 2-7m of nonfossiliferous compacted stoney mud which grades upward into 3-6m of fossiliferous conformable flat lying stone free muds containing an in situ H. arctica fauna. There is considerable relief (up to 8m) on the surface of the stoney muds which is however reduced to a few meters on the upper strata of the overlying muds. The conformable muds in turn grade upward into 21m of sandy foreset beds of a delta graded to a 71m sealevel. Foreset sequence consists of well sorted sands and muddy sands locally cut by erosional channels that are filled with basal gravels and less well sorted sands.

Quernbiter Q. 1 — Site of single main raised deltaic surface in Quernbiter fiord.
UTMG 18W VQ 4865E 79340N
Date 8A86
Elev.
Terrace Elev. 19m
R.S.L. 17-19m
M.L. ?

Comments:
This surface represents the only recognizable deltaic surface in Quernbiter. It is incised slightly below what appears to be a major outwash deposit or possibly an extensive alluvial fill unrelated to glacial meltwaters. This fill unit covers most of the valley floor inland from this site. The delta sediment outcrops in 1986 consisted of large impressive rotational blocks of frozen deltaic foreset and topsets beds that were tilting out of the outcrop (mass wasting) down toward the stream bed.

Feachem Valley 1 — Upper part of traverse where stream cut exposes morainal and outwash deposits.
UTMG 18W WQ 5265E 79794N
Date 10A86
Elev. 34m=terrace surface R.S.L.? may be wave washed
Sed. Samples: 1 - FV1 stoney mud sampled from cryoturbated surface of deposit.
2 - FV1 outwash? collected from stream cut.

Comments:
This site is the prominent surface of a moraine and outwash complex that dams Feachem Lake. The morphology consists of a flat terrace like feature that shows cryoturbated surfaces in places where stoney muds cropout. The major stream cut exposes what appears to be a coarse outwash although there is no good undisturbed section to examine.

Feachem
Valley 2
F.V. 2

Stream cut outcrop of beach sands overlying stoney muds.
UTMG 18W WQ 5268E 79794N
Date 10A86
Elev. 26m=beach strandline R.S.L.=25m
M.L. 25m?
Sed. Sample: 1 - stoney mud collected near base of stream cut (20m elev), probably equivalent to FV1.
Shell Sample: 1 - whole valves and valve fragments of Mya truncata and H. arctica. collected from float in lower stoney mud unit.

Comments:
The marine limit (early Holocene or late Foxe) in this area is difficult to determine because slope instability has destroyed much of the original land surface. It stands at least 25m and possibly higher. The base of the section exposed in the stream cut consists of 5.5m of fossiliferous stoney mud that contains pockets of moderately well sorted sands (these sands however may be slumped down from above). The surface of this unit is irregular (1m+ relief) and is overlain by 0.5m of lag gravels reworked from the underlying mud. This lag is in turn overlain by 3m of beach and eolian sands. Shell fragments of Mya truncata and Hiatella arctica in the beach deposit very likely represent reworked shells from the underlying mud. Limestones are common in the lower stoney mud where they may comprise 1% of clasts.

Feachem
Valley 3
F.V. 3

Fluvial deltaic sands cropping out above stream which runs on top of the stoney mud unit.
UTMG 18W WQ 5270E 79793N
Date 10A86
Elev. 22m=delta surface R.S.L.= approx. 22m
Shell Samples: 1 - whole valves and valve fragments of Macoma calcarea collected from float in the deltaic sands. This sample will not be dated as it probably represents reworked shells from the underlying stoney mud.

Comments:
Section exposed in stream cut consists of 9m of fluvial deltaic sands overlying the fossiliferous stoney mud. The stoney mud outcrops only in the stream bed which broadens out at this site and runs on the surface of the stoney mud unit. The abundant shells found at the base of outcrop are from the muds not the sands.

Feachem
Valley 4
F.V. 4

Stream cut exposure of foreset beds and trough fill sands both containing in situ fauna.
UTMG 18W WQ 5272E 79792N
Date 10A86
Elev. 15 - 20m R.S.L. see note

Sed. Samples:
1 - upper organic rich trough fill sands from 19m in outcrop.
2 - lower foreset bed sands from 15m in outcrop.

Shell Samples:
1 - FV4a - organic rich trough sp.; Large in situ paired valves primarily of Mytilus edulis and Macoma calcarea with lesser Mya truncata and H. arctica collected from upper trough fill sands
2 - FV4b - lower foreset beds; Primarily paired valves of Macoma calcarea, Hiatella arctica, and Mya truncata collected in situ from the lower foreset bed unit.

T.L. Samples:
1 - FV4 O.R.T.B.; collected in film canister from freshly cleaned exposure of organic rich trough beds.
2 - FV4 l.f.b.; collected in film canister from freshly cleaned exposure of lower foreset bed sands

Comments:
This 9m section exposes two distinct sandy units. The base consists of 3-4m of sandy delta foreset beds with the in situ Mya and Macoma fauna. This unit is overlain by 5-6m of trough fill sands which contain the in situ Mytilus and Macoma fauna. Their growth positions are closely associated with organic rich beds and heavy mineral rich beds within the sequence. They commonly occur as aggregate clusters of paired valves concentrated along the organic or heavy mineral beds. The exact sealevel of these deposits is uncertain because neither the trough beds nor the foreset beds can be traced into topsets at this locality. Therefore the top of the section appears to have been eroded away during the offlap sequence. It seems likely however that the sample relates to a 22m sealevel as indicated by the fluvial beds within the deltaic sequence at site F.V. 3.

FEACHEM VALLEY LOWER TRAVERSE

18m and 16m: Prominent Beach Ridge (eroded into older materials, primarily the stoney mud unit).

10m Broad vegetated bench with discontinuous beach strands projecting through.

2m Discontinuous and irregular beach ridges.

Comments: (next page)

There is no precise indication of the height of the holocene marine limit in Feachem Valley however it may stand at 26m (FV2). In comparison to CJ1 (17m) there is a clear indication of Holocene shoreline deleveling with greater total uplift occurring within Buchan Gulf.

PRE-LATE FOXE DEPOSITS OF THE BAFFIN BAY COAST NORTH OF BUCHAN GULF

Note: the locations of the following Cape Jameson sites are not shown on figure 1.

Cape Jameson 1
Eroded outwash deposits cropping out in gullies above the holocene marine limit.
UTMG 18W WQ 5287E 79827N
Date 10A86
Elev. 40m=terrace surface
R.S.L. <40m? M.L.?
Sed. Sample: 1 - coarse sands from gulley outcrop

Comments:
The surface expression of these deposits suggests an eroded terrace surface. The sediments that outcrop in the gullies and stream cuts are primarily coarse gravels and appear to be outwash. If this interpretation is correct the deposit must postdate the deltaic sequences sampled at higher elevations further north (CM sites and CJ10). Thus the outwash deposits are clearly graded to a sealevel that stood below the deltaic sequences of Cape Mac. and Cape Jameson.

CJ1
Holocene Beach Traverse

M.L. poorly developed strandline	17m
Prominent strandline	11-13m
Prominent strandline	4m

Comments:
Along this section of the coast the holocene marine strandlines are fairly well developed. The uppermost strandline or what I presume to represent the marine limit is often obscured by colluvium or soliflucted debris from the outwash deposits above.

Cape Jameson 10
Delta outcrop near radiocarbon dated shell collection site of Hodgson and Haselton (1974).
UTMG 18W WQ 5285E 79905N
Date 10A86
Elev. 32-39m Terrace Level=48m
Sed. Sample: 1 -
Shell Sample: 1 - Valve fragments of Mya truncata, H. arctica and Macoma calcarea collected from float in stoney mud.

Comments:
This site consists of wave cut and stream cut exposures of a thick stoney mud section overlain by deltaic sands. Several outcrops were examined around the area in an attempt to locate Hodgson and Haselton's (1974) shell collection site. Of all the sites visited this locality was the only one found to contain fossils. Unfortunately the site is presently covered by an extensive snowbank which obscures much of the outcrop and probably many of the fossils. Samples were collected for amino acid analysis.

GLACIAL AND MARINE DEPOSITS OF TAY SOUND, PAQUET BAY, AND THE COUTTS INLET SYSTEM

The following sample sites are from the interconnected fiord and valley system between Tay Sound and Coutts Inlet. All sample locations are shown in Figure 2. These samples were collected from morainal and ice contact deposits, from terraced outwash deposits graded to the moraines, and from raised sections of marine deposits whose sedimentologic character were strongly influenced by the early Holocene glacial/deglacial sequence.

A general chronology of glacial events can be reconstructed from the available data. At 9500 BP. a system of outlet glaciers in Tay Sound and Milne Inlet flowed to the margins of Eclipse Sound to construct the Cape Hatt ice contact delta (Klassen, 1985). These outlet glaciers were fed by the Foxe Basin ice dispersal center or from a plateau ice cap lying to the south of Tay Sound. A sequence of moraines mapped within the Coutts Inlet system suggest that this ice mass also fed outlet glaciers in these fiords.

The distribution of morainal and glacimarine deposits suggest that during deglaciation calving embayments migrated into inner Tay Sound and Paquet Bay and that the form of the ice sheet was then reduced to a series of lesser outlet glaciers descending to tidewater from the margins of the adjacent plateau. Only a few radiocarbon dates from many of the fossiliferous deposits in this area have yet been obtained, however they indicate that plateau ice influenced marine sedimentation from at least 8350±300 (I-724 in Hodgson and Haselton, 1974) through 7010±90 (GSC-4317, Tay Sound 2 of this report). Subsequent to this period of glacimarine sedimentation, deglaciation appears to have proceeded rapidly because stratigraphic sections show an abrupt upward transition into marine silts devoid of dropstones or into fine grained (more normal marine) deltaic sediments. Thus it appears that rapid retreat of the outlet glaciers into the plateau valleys facilitated the storage of coarse sediments in the valley outwash trains.

The following list of samples are grouped by geographic area according to the drainage systems from which they were collected

TAY SOUND 1: Proximal escarpment of ice contact deltaic complex.
UTMG 17W NK 5581E 79830N
Date 18J86
Elev. 74m
R.S.L. 78m
Sed. Samples: 1 - coarse sands exposed in stream cut of ice contact delta.

Comments:
Location at the western elbow in Tay sound. Coarse grained ice contact delta examined along wave cut exposure at the northern end of "long lake" and in stream cut at sample site. Distribution of foreset dip directions and existence of probable ice contact escarpment at northern end of "long lake" suggests that an outlet glacier occupying the lake valley was the sediment source. No fossils found at this site.

TAY SOUND 2: Sublittoral stoney muds underlying deltaic sequence.
UTMG 17W NK 5597E 79841N
Date 18J86
Elev. 60m
R.S.L. unknown-probably >78m
Sed. Samples: 1 - fossiliferous stoney mud exposed along river cut.
Shell Samples: 1 - whole valves and valve fragments of H. - arctica and M. edulis collected from outcrop and float across outcrop.

Comments:
Location is inland of western elbow of Tay Sound along western bank of river that flows out of "long lake". Stratigraphic section consists of approx. 4m of stoney muds overlain by about 14m of the ice contact delta sands of Tay Sound 2. Local terrace surface is at 78m but fossil sample cannot be directly related to this sealevel. Stoney mud outcrops at numerous sites extensively around the area of the Tay Sound elbow. Most of the clasts examined consisted of crystalline lithologies with a minor amount (<1%) of sedimentary clasts.

TAY SOUND 3: Outcrop of main deltaic sequence along river.
UTMG 17W NK 5591E 79847N
Date 18J86
Elev. 48m
R.S.L. 78m
Sed. Samples: 1 - sandy foreset beds from main Tay Sound delta complex.

Comments:
Location is along major river cut into the main ice contact deltaic complex in Tay Sound. Outcrop exposes foreset beds that can be traced upward into topset beds directly underlying the main terrace surface at 78m.

TAY SOUND 4: Fossiliferous foreset beds presumably of main delta
UTMG 17W NK 5608E 79876N
Date 18J86
Elev. 33m R.S.L. possibly 78m (see note)
Sed. Samples: 1 - muddy sand from fossiliferous foreset beds.
2 - coarse sandy foreset beds.
3 - intermediate well sorted sands of foreset beds.
Shell Sample: 1 - paired valves, whole single valves and valve fragments primarily of Mya truncata and Macoma sp. with lesser H. arctica and Musculus sp.

Comments:
Small tributary stream cut exposes interbedded sandy and muddy-sand foreset beds. Local observations at the site and airphoto analysis suggest that this exposure is cut into the main deltaic sequence and not into a subsequent delta formed at a lower sealevel. However, there does appear to be a 40m terrace surface or surface remnant above this site but I suspect that this is an erosional remnant formed be either fluvial erosion or wave action during sealevel regression. No topset foreset sequences were observed in the outcrop. Clasts from foreset beds include common sedimentary or meta sedimentary clasts - primarily black shales or slates however none of the sediments or clasts are calcareous. No topset beds preserved at this site because beach erosion during sealevel regression has either removed some of the delta sediments of reworked the delta face.

Discussion:
Tay Sound sealevel history appears to consist of a singular major delta forming event at the 78m sealevel. Local observations and airphoto examination suggest that there was no other delta construction phase post dating the main ice contact delta. This may be due to the elimination of coarse sediment supply from the fluvial system by the establishment of "long lake" during deglaciation. Most of the coarse sediment has been and is being deposited in the long lake delta. Therefore possible Holocene increases in discharge rates have not been recorded in the marine environment of western Tay Sound. The main delta phase was followed by sealevel regression that cut a series of beach shorelines into delta face from 60m down to present sealevel. From 78m to approx. 60m only discontinuous strandlines are preserved. From approx. 60m to present sealevel a well preserved series of nearly continuous beach strandlines are seen. These strandlines have very low relief and are heavily vegetated with few outcrops of underlying sediments. Therefore, they were not examined for fossils.

TAY S. MISC: Modern beach and tidal flat at river mouth.
UTMG 17W NK 5621E 79873N
Date 18J86
Elev. 0m

R.S.L. modern
Sed. Samples: 1 - sandy beach deposit near mean high tide.
2 - tidal flat sediment at -1.5m below mean high tide.

TAY SOUND 5: Shaley "ice contact" delta or submarine outwash fan
UTMG 17W NK 5741E 79885N
Date 18J86
Elev.
R.S.L. 11m down to present sealevel
Shell Samples: 1 - Tay Sound 5 lower delta unit; 5-8maht, shells from lower deltaic unit. Primarily whole valves of Mytilus edulis with lesser Mya sp., H. arctica, and Macoma sp. Sample collected from across much of the outcrop.
2 - Tay Sound 6 upper; 5-10maht, shells from the upper beach unit collected from several levels within the deposit. Species distribution similar to underlying delta so they may represent a reworking of shells from lower unit.
3 - Tay 5; 2maht; Whole valves and valve fragments primarily of H. arctica collected from the 2-3m level in the outcrop of the overlying beach unit.
4 - Tay 5; 10maht; Whole valves and valve fragments primarily of H. arctica from the 9-11m level of the overlying beach unit. Collected from outcrop and float on the surface of the uppermost part of the deposit.

Comments:
This landform is a prominent ice contact delta (no obvious stream sediment source) that is composed almost exclusively of black shale (or slate) fragments up to 10-15cm across in a sandy matrix. There are a few scattered rounded crystalline clasts. A wave cut escarpment facing NW exposes delta foreset type beds dipping towards the SE. The upper surface of the deposit has been reworked into beach deposits that show a series of strandlines extending from the top of the deposit down to present sealevel. This deposit consists only of shale fragments, the fines having been washed out by wave action. The sediment composition of this delta must represent the local bedrock of the floor of Tay Sound which was dredged or entrained from the sea bed by an outlet glacier flowing in the Tay Sound trough.

TAY SOUND 6: Sublittoral muds and stoney muds outcroping from beneath the outwash deltas of innermost Tay Sound.
UTMG 17W NK 5869E 79757N
Date 18J86

Elev. 2m (base of stream cut) to 12m (erosional terrace level) = approx. 10m section.
R.S.L. ? (sub-littoral deposits)
Sed. Samples: 1 - lower unit-dark stoney mud with boulder, cobble, and pebble clasts (crops out at base of stream cut).
2 - lower unit-sample of 6cm thick sand bed within stoney mud.
3 - lower unit-massive muddy sands (upper part of the lower unit) containing the abundant Mya fauna.
4 - upper unit-light colored laminated well sorted silts with minor pebble or cobble clasts. Contains the juvenile Mytilus fauna.
Shell Samples: 1 - Tay Sound 6 lower; 5maht, Whole single and paired valves of Mya sp. and Serripes groenlandicus from upper part of stoney mud unit.
2 - Tay Sound 6 upper; 8maht, Whole single and paired valves (mostly juvenile) of Mytilus edulis from upper unit of well sorted silts.
3 - Tay Sound 6 both; Combined collection of all species present.

Comments;
Two stratigraphic units of sublittoral muds are clearly indicated by the litho- and biostratigraphy at this site. The lower unit (6m thick) is poorly sorted and crudely stratified consisting primarily of massive stoney muds (clast size ranging up to 60cm) or stratified muds disrupted by dropstones interbedded with sand layers up to 15cm thick. This unit grades upward into 2-4m of light colored well sorted silts in laminar beds from about 3mm to 3cm in thickness. A very few dropstone clasts are also found in this unit. The two units are also clearly differentiated on the basis of their macrofossil content. The lower shell collection comes from the upper part of the lower stoney mud unit and a transition zone into the upper silt unit. The upper shell sample was collected from a very narrow zone in the laminated silts. The stratigraphy probably records an ice margin retreat phase from ice contact to ice proximal (lower unit) to ice distal or ice free (upper unit).

PAQUET BAY SAMPLES

P.B.1: Low fluvial terrace near junction of the main river flowing into Paquet Bay and its first tributary stream valley.
UTMG 18W VQ 4066E 79608N
Date 19J86
Elev. 12m
Terrace Elev. 15m
Sed. Samples: 1 - coarse stratified fluvial sands and gravels
Organics: 1 - Organics buried by channel fill deposits.

Comments:
4m section exposed along abandoned river channel. Terrace surface about 5-6m above main river level at this site. Organics are probably vegetation that covered an abandoned channel that was later reactivated possibly by a spring flood transporting sediment that buried the organics. Radiocarbon date could indicate an approximate age of active fluvial sedimentation at this surface. Sediment texture varies from well sorted fine sands to sands with up to 60% well rounded gravel content. Clast size varies from pebble up to approx 20cm.

P.B. 2: Stoney mud overlain by flat bedded sands (delta bottomsets) outcroping along main river channel just downstream from second tributary stream junction.
UTMG 18W VQ 4078E 79594N
Date 19J86
Elev. 38m
Terrace Elev. 44m
Sed. Sample 1 - well sorted stratified sands of main delta bottomset beds.

Comments:
Base of section consists of stratified stoney muds with planner flat lying or undulating beds from a few mm to 4cm thickness. Contains locally abundant dropstones of exclusively crystalline lithology with most common clast size from 6-10cm and largest up to 20cm. Clast size distribution appears to be very similar to the stream gravel dist. of previous terrace site. The local river bed gravels are primarily reworked dropstone clasts. Surface morphology of the stoney muds appears to be very irregular with several meters of relief. No specific site was observed at which the muds graded upwards into the bottomset beds so the transition may represent an unconformable surface. Similarly, the flat lying sands are overlain by about 2m of fluvial gravels. This section shows evidence for multiple unconformities.

P.B. 3 Outcrop of delta foresets and bottomsets along first tributary stream valley.
UTMG 18W VQ 4055E 79600N
Date 20J86
Elev. 41m
R.S.L. 49m for foresets but shells from bottomsets that cannot be traced to foresets.
Terrace Elev. 2 prominent levels
51m=main delta surface
45.5m=fluvial terrace downcut into main delta surface
Sed. Samples: 1 - sandy flat lying bottom set beds.
2 - muddy sand flat lying bottomset beds.
3 - coarse sandy foreset beds
4 - gravely foreset beds

Shell Samples: 1 - small collection from float near bottom of section of whole single and paired valves of Macoma calcarea. *see PB14 or 16 for shell sample of this deposit.

Comments:
Excellent multi-faceted outcrops of 30m section of the main deltaic sequence underlying the 65m terrace (slopes from 50-80m). This surface represents a second major delta formation period just subsequent to an uppermost ice contact delta formed during the initial stages of deglaciation. Shallow bottomset beds (=10-15m water depth) grade upward into foreset to topset beds across the outcrop. Some of the foreset beds consist of finer sands that are very similar to the sandy bottomset beds in texture. There is a clear gradation in grain sizes from the gravely foreset beds down into the fine bottomsets with interbedding of variable texture sediments in a foreset transition zone. 8 Foreset bed dips were measured between 12 to 16 degrees toward bearings 260 to 290. Larger clasts (from topsets) include primarily crystalline clasts with minor (<1%) sedimentary or meta-sedimentary clasts (quartzites and black slates up to 1cm thick).

P.B. 4 Low fluvial terrace segment about 4m above stream level.
UTMG 18W VQ 4062E 79611N
Date 21J86
Elev. 14-15m
Terrace Elev. 16m
Sed. Sample: 1 - fluvial gravels
Organics: 1 - base of dark organic rich sands overlying fluvial gravels (approx 15m)

Comments:
Outcrop along stream bed consists of approx. 3.5m of fluvial gravels capped by sandy organic rich colluvium and intermixed eolian sediments.

P.B. 5 Main river cut into the "30m" terraces exposes 15m of flat lying sands (delta bottomsets?) overlain by 5m of foresets and 1m of topset beds.
UTMG 18W VQ 4060E 79618N
Date 21J86 and 6A86
Elev. samples at 10m, 11m, 15.5m, and 17m
Terrace Elev. 29.5m
R.S.L. ? foreset sequence may not be conformable to bottomsets.
Sed. Samples: 1 - "A"-flatlying well sorted sandy beds from lower part of section (10m).
2 - "B"-muddy sand beds just overlying "A" (11m).
3 - sandy and muddy sand couplets sampled in place (17m).

4 - single coarse sand layer (1cm thick) that represents the coarsest texture of any bed in this outcrop. sampled from 15.5m

Comments:
Approx. 21m of section are exposed along this river cut and the sample site is from the lower 3m which were cleared for detailed examination. Lower part of section consists of 2m of thick flat lying sand beds (up to 10-12cm) (sample 1) with minor interbedded muddy sand beds ≤1cm. Sharp contact with 1m of overlying sandy muds (sample 2) interbedded with sand laminae. Other samples include an in situ sample of sand/muddy sand couplets and a thin (2cm) coarse sand layer that represents the coarsest bed observed in the entire bottomset section. This sequence represents a transitional section between basal stoney muds and a prograding deltaic sequence.

P.B. 6 Near PB5 but higher in the section.
UTMG 18W VQ 4059E 79618N
Date 21J86 and 6A86
Elev. 22m=bottomset samples
27m=elev. of foreset dip measurements
Terrace Elev. 29.5m
R.S.L. ? bottomsets from which the shells were taken are not necessarily conformable to the overlying topsets
Sed. Sample: 1 - sample from a 6cm thick muddy bed (22m) which appears to be the finest grained bed in the bottomset section.
Shell Sample: 1 - whole valves and valve fragments of Mya truncata and Macoma sp. collected from float or in situ from muddy flat lying bottomset bed.

Comments:
Muddy beds are more prominent in the middle and upper part of the flat lying section where they increase both in number and in thickness (2mm to 15cm). Minor interbedded sand layers most of which are a few mm to a few cm thickness with a very few up to 10cm. Also at this section about 4m of delta foreset beds overly the flat lying sequence. At no place however could the foresets be traced with certainty into the bottomsets. Several foreset dips were measured at this site and toward the north along the stream cut. The sequence beginning at PB6 is 5 to 17 degrees toward 250, 10-055, 15-015, 15-005, and 5-020 at northern end of outcrop.

P.B. 7 Main river cut into a deformed sequence of glacial and marine sediments 2km inland from river mouth.
UTMG 18W VQ 4061E 79624N
Date 21J86
Elev. 7m
R.S.L. sub-littoral deposit (possibly dating near the marine limit phase?)

Sed. Sample: 1 - undisturbed stratified muds directly overlying deformed sequence.
2 - Overcompacted, crudely stratified till like diamict folded and thrusted into a push moraine(?).
Shell Sample: 1 - 4 paired valves of Macoma calcarea collected from rill wash in untectonized muds.

Comments:
The base of this 10m section consists of 2m of a compact, crudely stratified till (coarse stoney mud) that was thrust upward into and deformed about 7m of flat lying thin bedded (2mm-2cm) silts containing abundant dropstones. Numerous open folds and recumbant folds can be seen in the section as well as high angle reverse and thrust faults. The tectonized part of the section is separated from the overlying undisturbed silts by an angular unconformity however, toward the distal part of the tectonized sequence (northwest) progressively less deformed silts appear to grade conformably into the flat lying silts from which the shells were sampled. Therefore it seems likely that the shells would provide a close minimum age estimate for the tectonization. It is uncertain whether or not the undisturbed muds are equivalent to the stratified deposits of PB5 and 6 since they cannot be traced directly from outcrop to outcrop.

P.B. 8 River cut exposure of delta foreset beds 1km from river mouth.
UTMG 18W VQ 4052E 79626N
Date 21J86 and 6A86
Elev. 21m
Terrace Elev. 28m (measured) 30m+ from map
R.S.L. 28m
Sed. Sample: 1 - ?
Shell Sample: 1 - whole single and paired valves of Mya truncata and M. arenaria with minor Macoma sp. collected from float or excavated from a single muddy foreset bed.

Comments:
This sample should provide an excellent date on the 28m sealevel. Several dip directions varying from 15 to 29 degrees almost due west were measured on this outcrop.

P.B. 9 Isolated kame or moraine segment surrounded by fluvial deltaic surface of the "65m" terrace.
UTMG 18W VQ 4061E 79583N
Date 23J86
Elev. 72m
Sed. Sample: 1 - Sample of coarse sand in the C horizon from 40cm depth in soil pit dug on surface of moraine.

Comments:

Soil pit shows a 2cm A horizon overlying 14cm Cambic B and unmodified Cn. The B horizon thickness may be augmented since this site was probably at least briefly under marine water influence and thus accelerated weathering rates due to the mechanical action of salt crystallization. There is also a prominent "strandline" like feature cut into the south side of the moraine however, it is not possible to confirm that it is a wave cut rather than a fluvial feature.

P.B. 10 Ice proximal "side valley" outwash deposits from south flank of valley fill.
UTMG 18W VQ 4064E 79567N
Date 23J86
Elev. 95m
R.S.L. above the marine limit
Sed. Sample: 1 - Coarse outwash gravels sampled from stream cut into apex of outwash fan where the stream issues from a canyon cut into crystalline bedrock. Only crystalline lithologies are observed in the clasts here.

P.B. 11 Ground moraine site on bedrock surface above falls on south flank of Paquet valley.
UTMG 18W VQ 4052E 79554N
Date 23J86
Elev. 195m
Sed. Sample: 1 - Sample of coarse sandy till collected from Cn horizon at 35cm in soil pit.

Comments:
Soil pit reveals 1cm discontinuous A horizon, a 12cm Cambic B, and unmodified Cn. Scattered limestones are also observed on surface in vacinity of this sample site.

P.B. 12 Frost churned silty till deposit on lower slope of south valley side wall.
UTMG 18 VQ 4059E 79567N
Date 23J86
Elev. 105m
R.S.L. No evidence of marine submergence at this site.
Sed. Sample: 1 - Sample taken from surface of frost boil. Fine grained texture may represent efficient comminution of till matrix or may be due to concentration of fines by cryoturbation. No soils where observed at this site.

P.B. 13 Organic rich fluvial sediments from one of the main terraces in first tributary stream valley.
UTMG 18W VQ 4057E 79604N

Date 24J86
Elev. 25m
Terrace Elev. 26m
R.S.L. <20m
Sed. Sample: 1 - fluvial gravels underlying organic beds. Sampled from outcrop along stream cut.
2 - sample taken from 12cm thick sand layer from between two organic beds.
Organics: 1 - sample taken from lower organic rich bed (2cm thick).

Comments:
Stream cut exposes about 3m of fluvial gravels consisting of lower and upper gravel units separated by two organic rich layers in a 12cm sand bed. Sand unit may represent eolian sedimentation on flood plain of dry fluvial channel between two major episodes of fluvial sedimentation.

P.B. 14 Deep gully cut into the 50m delta.
UTMG 18W VQ 4054E 79597N
Date 24J86
Elev. 40m
R.S.L. approx. 50m
Sed. Samples: 1 - uppermost part of a sandy foreset bed just where it tips off the delta front.
2 - the gravely foreset bed that is the fluvial component of the sample 1 foreset bed.
3 - coarse sandy matrix of uppermost part of the fluvial section containing the coarsest gravels.

Comments:
2m section near the top of the outcrop was examined in detail. Here the delta foreset beds grade upward into fluvial topsets. The terrace surface above this site grades toward the moraine outcrop at PB15. Uppermost topset beds contain approx 50-70% >2mm gravels.

P.B. 15 Moraine segment outcropping within or partially buried by deltaic sequence of the 60+m terrace.
UTMG 18W VQ 4055E 79593N
Date 24J86
Elev. 58m
R.S.L. probably ≥ about 60m
Terrace Elev. 61m
Sed. Sample: 1 - stoney silt from the moraine core.
2 - fossiliferous stratified silts (with dropstones) immediately distal (about 15m distance) to the moraine.
Shell Sample: 1 - primarily whole single valves and valve fragments of juvenile H. arctica with minor Macoma sp.

Comments:

This moraine appears to be partially buried by the fluvial deltaic sediments of the main terrace surface (60+m at this location). The relationship between delta and moraine is not clear. The sequence may represent an ice contact delta (in which case the shells would date the period of moraine formation) or the moraine may have been buried by subsequent delta progradation. Moraine is cored by a stoney silt with most of the local stream boulders being eroded from the moraine. A very minor percentage of boulder clasts are sedimentary lithologies the rest are crystalline. The moraine stands in slight positive relief (2-3m) above the surrounding terrace surface and parallels two other moraine segments to the south. Local jog in the stream coarse clearly follows the outcrop of this moraine.

P.B. 16 Stream cut through the 51m delta along first tributary to the main river flowing into Paquet Bay.
5A86 UTMG 18W VQ 4057E 79598N
Date 5A86
Elev. 41m
Terrace Elev. 51m = delta surface
R.S.L. 49-51m
Sed. Samples: 1 -
Shell Samples: 1 - in situ paired valves of two unknown species and juvenile Mya truncata excavated from a single muddy foreset bed grading to 49m topset beds.

Comments:
Prominent foreset beds outcrop along much of this deep gully exposure. Measured dip directions cluster around 16 degrees toward S30W or 210. Thin bedded sandy foreset beds (2-6cm thick) and existence of only juvenile species in isolated slightly thicker muddy foreset bed (8cm) suggest sedimentation was rapid enough that molluscs could not grow to maturity before burial. This sample will provide an excellent date on the 49m sealevel (51m terrace level).

P.B. 16 Organic rich channel fill deposits underlying fluvial
24J86 terrace cut 3.5m below surface of main delta (51m).
UTMG 18W VQ 4057E 79598N
Date 24J86
Elev. 45m (organics sample site)
Terrace Elev. 47.5m = surface of fluvial erosion terrace
R.S.L. <47.5
Sed. Samples: 1 - with organics
Organics: 1 - PB16 upper; sample of the upper layer of organic rich sands.
2 - PB16 lower; sample of the lower layer of organic rich sands.

Comments:
This site lies within one of the deep gullys eroded into the main deltaic complex along the first tributary stream valley. The deposit consists

of two prominent organic beds (up to 5cm thick) in fluvial channel fill sediments that underlie an erosional terrace cut 3.5m below the delta surface (51m) (PB16 of 5A86). The organics may date from the time when the fluvial channels were last active. A comparison with other shell dates that constrain relative sealevel should indicate the reliability of these organic dates.

P.B. 17 Organics from erosion channel breached through delta spur 1km south of river mouth.
UTMG 18W VQ 4052E 79629N
Date 25J86
Elev.
Organics: 1 - sample from base of channel cut through the delta remnant.

Comments:
Probably represents vegetation growing in an abandoned fluvial channel. The channel appears to have been cut off after the main river channel was cut down below the level of the breach. The organic layer caps fluvial gravels and is in turn overlain by eolian sands.

P.B. 17 Foreset dip directions measured in outcrop below notch were 16 to 21 degrees toward 300

P.B. 18 Sublittoral marine muds outcropping just inland from the southernmost tip of Paquet Bay-east arm.
UTMG 18W VQ 4041E 79624N
Date: 25J86
Elev. 14m R.S.L. ?-sublittoral deposit
Sed. Samples: 1 - lower massive black mud unit.
2 - middle fossiliferous stratified silts.
3 - upper finely laminated sands.
Shell Samples: 1 - 8 small paired valves of H. arctica and juvenile Mya truncata excavated from the lower mud unit.
2 - whole valves, some paired, and valve fragments of H. arctica, Mya truncata, Clinocardium ciliatum?, and Serripes groenlandicus from the middle stratified silts.
3 - small collection from the stream bed includes above species + Macoma sp. and Mytilus edulis. NOT FOR DATING.

Comments:
Good exposure along stream cut near shore of Paquet Bay shows three different marine units. The lower most is 2-3m of massive muddy fine sands outcropping just above the stream bed. The middle unit consists of transitional stratified silts with some fine sands. (comparison of dates form these two units could give good info on offshore sedimentation rates). The uppermost unit exposed in this outcrop consists of finely

laminated sands. Muds contain very few drop stones however of the observed stones approx. 50% are sedimentary clasts. These sediments may record a relatively deep offshore prograding deltaic sequence in which upper laminated sands represent deltaic bottomset beds.

P.B. 18a outcrop of marine muds above PB18
UTMG 18W VQ 4037E 79623N
Date 31J86
Elev. 14m
R.S.L. sub-littoral muds

Comments:
This is the next good outcrop upstream from PB18 and two stratigraphic units are exposed here. The lower unit is a stoney mud (with approx. 5% by volume of clasts) that grades upward into a well sorted silt with very few dropstones.

P.B. 18b Next outcrop following up gully.
UTMG 18W VQ 4036E 79623N
Date 31J86
Elev. 36m
R.S.L. sub-littoral muds

Comments:
Stoney muds with 5% clasts of which most are crystalline but with 1% sedimentary or metasedimentary rocks (shales, slates, and quartzites).

P.B. 20 Stoney mud outcrop along main river 8km upstream from mouth.
UTMG 18W VQ 4095E 79578N
Date 27J86
Elev. 44m
Sed. Sample: 1 - sample of diamict from north bank of river.

P.B.21 Ice contact delta system at head of west arm of Paquet Bay.
UTMG 18W UQ 3993E 79642N
Date 27J86
Elev. 65m
R.S.L. 68-75m
Sed. Sample: 1 - coarse grained fluvial topset gravels
2 - coarse sand and gravelly foreset beds

Comments:
Ice proximal/ice contact deltaic complex that links east and west Paquet Bays. Delta surface of 68m in west Paquet Bay grades 5.5km through connecting valley to morainal and Ice contact escarpment at 90m in East Paquet Bay. This complex has been preserved intact since deposition except for entrenchment of underfit stream. It represents a moraine/outwash system that grades to the marine limit phase. Gravel % (>2mm) varies from 50 to 70% in outcrop with clast sizes up to 50cm. Clasts are exclusively crystalline.

P.B. 22 Wave cut exposure of terminal moraine cored by fossiliferous marine stoney muds (near head of west Paquet Bay).

UTMG 18W UQ 3984E 79657N
Date 27J86
Elev. 2-15m
R.S.L. sub-littoral muds possibly marine limit phase.
Sed. Sample: 1 - lower massive stoney silts
2 - upper laminated silts with sand stringers.
Shell Sample: 1 - whole valves and valve fragments of Macoma calcarea and H. arctica with a few partial valves of Mytilus edulis and Chlamys islandica collected from float from the upper part of the section.

Comments:
Scattered dropstone clasts (5-10% by volume) occur throughout the lower massive silt unit (6m thick). Most clast are of pebble size (1-2cm) however some ranging up to 20cm were also observed. Clasts are primarily crystalline (granites and gneisses) but with about 5-7% sedimentary lithologies. Shells collected from float and appear to be coming from the upper part of the exposure (about 12m section in wave cut exposure) or the laminated silts. Approx 8m of stratified silts are exposed here however it was not possible to tell whether those silts immediately post date the moraine or if they were tectonized during the formation of the moraine.

P.B. 23 Wave cut exposure of morainal/submarine outwash sequence in Paquet Bay west arm.

UTMG 18W UQ 3963E 79676N
Date 27J86
Elev. 2-11m R.S.L. >11m
Sed. Samples: 1 - coarse stratified sands and gravels from the base of the submarine outwash facies.
2 - sorted sands from the upper part of the submarine outwash facies.
Shell Samples: 1 - Paired valves and whole single valves of H. arctica, Mya truncata, and juvenile Mytilus edulis from the sandy stratified facies.
2 - whole large valves and valve fragments of H. arctica, Mya truncata and Mytilus edulis from the muddy facies of the moraine core.

Comments:
Multiple facies sequence of moraine core grading into submarine outwash sands and gravels outcropping along wave cut exposure on the western shore of Paquet Bay west arm. Core of moraine (proximal or ice contact facies) appears to consist of massive muds and stoney muds that grade laterally (toward the SE) into the gravelly submarine outwash (distal or water washed facies). Base of outwash section consists of a poorly sorted,

poorly to well stratified coarse gravel grading upward into well sorted but poorly bedded sands near the top of the section. Muddy core may represent thrust moraine or "frontal dump" sedimentation however this cannot be determined from the poor exposure of the mud at this site. Outwash represents coarse facies deposited by meltwater plume at ice margin. The trend of the moraines along this arm of Paquet Bay suggests that initial deglaciation of Paquet Bay had occurred and that these moraines were deposited by tidewater valley glaciers flowing in from the southwest.

P.B. 24 Stream cut exposure of coarse outwash/deltaic sequence along second tributary stream near junction with river.
UTMG 18W VQ 4077E 79589N
Date 29J86
Elev. 30m=base of section
R.S.L. ?
Sed. Samples: 1 -

Comments:
This section is just around the corner from PB2 yet there is a distinct influence of coarse grained outwash sedimentation from the side valley system at this sight. Section consists of 6m of fine well sorted interbedded or interlaminated sands and silts of delta foreset beds which are overlain by 1-2.5m of coarse gravels of the outwash fan. Foreset dips measured between 25 and 27 degrees towards the N-NW whereas the sand beds at PB2 are flat lying. This may indicate that there is an unconformity between the delta sands and the outwash gravels. During the time of progradation of the side valley fan there may have been considerable erosion of the emerging deltaic deposits. It is difficult to say where sealevel was at the time the fan was constructed since no indisputable fan/deltaic facies have been identified.

P.B. 25 Multi terrace delta exposure along first tributary stream.
UTMG 18W VQ 4061E 79609N
Date 30J86
Elev. samples from 28m, 29m, 32m, and 33m
Terrace Elev. 40m and 33m
R.S.L. complex fluctuations between 40m and 33m.
Sed. Samples: 1 - coarse gravels from the base of the channel fill in the foresets (29m).
2 - well sorted foreset sands (28m).
3 - muddy sand foreset bed (29m).
4 - fluvial sands (32m); from lateral extension of 33m terrace gravels into (below) the 40m terrace.
5 - fluvial gravels (33m); similar relationship as sample 4.

Comments:
Stream cut exposure of approx 24m of a complex deltaic sequence. Lower 16m consists of sands and muddy sands in foreset beds with 7 measured

dip directions of 24 to 31 degrees toward N25W. There is also a prominent erosional channel cut into the foreset beds and back filled with gravels and stratified sands. These foresets are overlain (apparently conformably but...?) by 2m of topset beds that underlie the 35m terrace level and extend laterally (horizontal) into the outcrop of the extended section below the 41m terrace level. Here the topsets are buried by a complex 6m sequence of interbedded topset gravels and shallow but unmistakeable sandy foresets. The section is interpreted as evidence for a series of sealevel events which include an initial stage of delta progradation at the 35m sealevel (lower terrace level). This relies on the assumption that the topset foreset sequence of the 35m terrace is conformable. Secondly, complex sealevel fluctuations must have occurred between 35m and 41m in order to facilitate deposition of interbedded foresets and topsets. Lastly, it appears that sealevel should have fallen back to the 35m level to allow for the fluvial erosion to cut the terrace escarpment between the 41m and 35m terraces. Therefore, the fluvial beds (topsets?) of the 35m terrace may not be conformable to the underlying foresets.

P.B. 26 Poor outcrop of deltaic sediments near the elevation of the prominant kame terrace.
UTMG 18W VQ 4034E 79615N
Date site visited on J86 and 3A86
Elev. 72m
R.S.L. 75m? irregular terrace surface showing little deltaic morphology.
Sed. Sample: 1 -
Shell Sample: 1 - 3 fragments of Mya truncata excavated from delta? sands.

Comments:
This deposit appears to be a delta remnant that lies within a series of morainal or ice contact deposits. It is not clear however if the local irregular topography can be attributed to glacial depositional forms or to subsequent fluvial and or marine erosion.

P.B. 27 Stoney muds and well sorted silts outcropping along west flank of Paquet Bay east arm.
UTMG 18W VQ 4034E 79631N
Date 31J86
Elev. 30m
R.S.L. sub-littoral muds
Sed. Samples: 1 -
Shell Samples: 1 - primarily valve fragments of Hiatella arctica collected from the transition zone between the lower stoney muds and upper well sorted silts.

Comments:
The stratigraphy of most of the outcrops along the west flank of Paquet Bay (east arm) appears to be very similar. There is a lower dark stoney

mud typically containing about 5% clasts by volume which grades upward into light colored, stratified, well sorted silts. It is difficult to correlate from one outcrop to the next but my feeling is that there are more than one stoney mud beds across the entire area.

P.B. 28 Morainal stoney mud deposit outcropping near western shore of Paquet Bay east arm.
UTMG 18W VQ 4034E 79634N
Date 31J86
Elev. 3-12m
R.S.L. sub-littoral muds
Sed. Samples: 1 - PB28 A; pebbly mud from base of section (4maht) near the shell collection site.
2 - PB28 B; sample of one of the sand beds that occurs in the stoney mud. (this sample taken from 20cm below A)
Shell Samples: 1 - paired valves of a single species of Yoldia? or Portlandia? from base of outcrop in muds containing scattered dropstones.

Comments:
Extensive wave and stream cut outcrop exposes stratified muds and sands. A lower mud containing scattered dropstones occurs at the base of the section. There is noticeable topographic relief (4-5m) on the upper surface of this lower unit however it does appear to grade upward into conformable flat lying stratified silts. The morphology of the outcrop suggests a moraine like form. The sediments of the lower part of the section are quite deformed with numerous examples of high angle reverse and thrust faults along with extensive tight folding. They may represent soft sediment deformation associated with glacial tectonism. The interpretation is that the lower section represents ice marginal deposition and processes with a retreating ice source for the sedimentation of the the upper stratified silts.

P.B. 29 Low relief "outcrop" of fossiliferous silts.
UTMG 18W VQ 4040E 79617N
Date 3A86
Elev. 43m
R.S.L. sub-littoral silts
Sed. Sample: none collected because nothing is "in place".
Shell Sample: 1 - Valve fragments and whole valves of Mya truncata, Hiatella arctica, and Macoma calcarea collected from surface float.

Comments:
No true outcrop of the silts at this site, it is simply a 10m^2 area that is free of vegetation where the silts are eroding out on the surface. Many shells found in the float however none were excavated from the deposit. There are a few cobble and boulder clasts also weathering out of this deposit. My impression of the site is that it is the upper silt unit rather than the lower stoney mud unit however the fauna is comparable

to the lower unit of PB18. Also this is the highest fossiliferous silt outcrop identified in this area. Whether or not that means it is from the highest part of the marine mud section is speculative.

P.B. 30 Marine limit delta and associated moraine on western margin of Paquet Bay fill sequence.

UTMG 18W VQ 4029E 79624N
Date 3A86
Elev. 75m
R.S.L. 78-82m
M.L. Approx. 82m

Sed. Samples:
1 - Well sorted sands from delta foreset bed.
2 - Muddy sands from delta foreset bed.
3 - Till matrix collected from the moraine core.

Shell Samples:
1 - Whole valves and valve fragments of juvenile Macoma calcarea and Mya truncata collected from upper float above the snowbank.
2 - Mainly whole valves of Macoma calcarea, Mya truncata, and H. arctica collected from sheet wash deposits below the snowbank. Collection site is washed by organic rich meltwater from the snowbank.
3 - A few shell fragments collected from the till that outcrops in the core of the moraine segment.

Organics:
1 - Organic layer on overlying the delta sediments and buried by 70cm of organic rich eolian sands.

Comments:
Stream and perennial snowbank cut exposes a morainal segment with onlapping deltaic sediments at this site. This is the highest marine delta yet identified and it appears to represent the marine limit. Foreset beds dip to the northwest between 15 to 25 degrees. The snowbank partially obscures the outcrop and shells collected from sheet wash deposits below the snowbank are bathed in its meltwater. The snowbank contains much wind blown organic debris therefore contamination of the lower shell sample by organic rich meltwater is a possibility. Moraine segment at this site is mostly seen in outcrop and has only a very slight surface expression. Furthermore, it is not clear whether the delta sediments are genetically related to the moraine or subsequently buried it. The surrounding topography shows an irregular delta surface nested between several subdued moraine segments that project above it in slight positive relief (1-2m). Moraines which outcrop at elevations below this delta (marine limit?) appear to be wave washed whereas above that surface, though they are relatively subdued, show no clear evidence for wave erosion. Till consists of a compact stoney mud with mostly crystalline clasts ranging up to 50cm in diameter. Boulders comprise about 50% by volume of the till. About 10-20% of the pebble and cobble clasts are shaley fragments.

P.B. 31 Northern most outcrop of marine muds along west shore of Paquet Bay east arm.
UTMG 18W VQ 4031E 79672N
Date 7A86
Elev. 2-7m
R.S.L. sub-littoral marine stoney muds
Sed. Sample: 1 -
Shell Sample: 1 - whole valves, valve fragments and some paired valves primarily of H. arctica with a few specimens of Mytilus edulis and Macoma sp. collected from float on stoney mud.

Comments:
Lithologically this deposit would appear to correlate to the stoney muds of inner Paquet Bay however I am not sure if those muds contain Mytilus edulis. Therefore they may represent slightly younger, warmer water sediments(?).

P.B. 32 Prominent marine limit delta terrace on east side of river.
UTMG 18W VQ 4074E 79605N
Date 8A86
Elev. 75m
Terrace Level 78-80m
M.L. Presumably 78-80m
Sed. Sample: 1 - coarse grained ice proximal deltaic sediments from gully exposure.

Comments:
This terrace has a relatively flat surface that extends for some 14km along the east valley wall. Several of the gully cuts in this terrace where examined near the site and each exposes deltaic foreset beds. Also site PB30 which appears to be the marine limit delta in Paquet Bay, hand levels out to the same surface as this terrace. It does however seem unusual that such an extensive terrace would have an essentially flat surface profile.

P.B. 33 Late glacial moraine and outwash deposits approaching drainage divide between Paquet Valley and North Arm valley.
UTMG 18W VQ 4286E 79487N
Date 8A86
Elev. 175m
Sed. Sample: 1 - Till from 30cm depth (Cn horizon) in soil pit excavated in moraine crest.
2 - Outwash immediately distal to moraine of sample 1. sampled along stream cut adjacent to moraine.

Comments:
Moraine shows a poorly formed, indistinct Cambic B horizon 7-8cm thick. Cn horizon shows blonde colors while B shows subtle reddish orange colors.

North Arm 1 48m delta in parallel valley to North Arm of Coutts Inlet.
UTMG 18W VQ 4520E 79703N
Date 7A86
Elev. 45m
R.S.L. 46-48m
M.L. 70-74m
Sed. Samples: 1 - fossiliferous delta foreset sands
Shell Samples: 1 - whole small valves of Macoma sp. collected from float from sandy delta foreset beds.

Comments:
This sample represents a significant period of Holocene deltaic sedimentation in North Arm. The next highest prominent marine terrace in this valley is the marine limit terrace of NA3. There are only two major deltaic systems preserved in this valley (this site and the marine limit delta) and these may represent periods of sealevel stability or increased sediment supply. Since the deposition of the 48m delta there has been a great deal of post glacial fluvial recycling and erosion of previously extensive deltaic deposits. Therefore the raised delta surfaces exist in scattered remnants and much of the floor of this valley is underlain by sandy post glacial alluvium reworked from the deltaic sediments.

North Arm 2 Stoney muddy sand underlying delta sands of NA1
UTMG 18W VQ 4520E 79703N
Date 7A86
Elev. 42m
R.S.L. sub-littoral sandy muds
Sed. Sample: 1 - stoney muddy sands from beneath delta sands of NA1
Shell Sample: 1 - whole valves and valve fragments of H. arctica and Mya truncata collected from float on stoney muddy sand underlying delta sands of NA1.

Comments:
This unit is interpreted as a sequence of deltaic bottomset beds related to the foreset beds of NA1.

North Arm 3 Marine limit "kame delta"
UTMG 18W VQ 4428E 79708N
Date 7A86
Elev. 68m
R.S.L. 70-74m=Terrace Level
M.L. 70-74m
Sed. Sample: 1 - fluvial top set coarse gravels

Comments:
This deposit probably represents the marine limit in this section of North Arm. The sediments in gully exposures appear to be foreset sands and topset gravels however no marine shells were found. The presence of numerous perched boulders on bedrock surfaces immediately above this delta level indicate that marine inundation did not extend above 74m. The ice proximal if not ice contact nature of this delta is indicated by the coarse nature of the sediments. The >2mm fraction of the coarse gravels comprises an estimated 50% in the fresh outcrops.

North Arm 4 Outwash fan from drainage of late Holocene ice dammed lakes in upper North Arm
UTMG 18W VQ 4515E 79723N
Date 7A86
Elev. 2m to 0m
Sed. Sample: 1 - coarse sand matrix of alluvial fan

Comments:
Surface cover of boulders on the deposit is commonly 90-95% with 5-10% coarse sandy matrix which was sampled. Most of the fines appear to have been washed completely out of the deposit. The size distribution of surface boulders was measured at the site and estimated over the extent of the deposit from photographs.

North Arm 5 Most extensive raised delta surface of inner North Arm.
North Arm 7 UTMG 18W VQ 4462E 79590N
North Arm 8 UTMG 18W VQ 4462E 79582N
Date 7A86
Elev. NA7; 60m
NA8; 67m
Terrace Level Approx. 70m
R.S.L. Approx. 65-70m
M.L. Approx. 100-110m
Sed. Sample: 1 - NA7; coarse delta sands probably from foreset beds.
2 - NA8; coarse gravels from topset beds at helicopter landing site.

Comments:
This delta surface represents a major period of coarse grained deltaic sedimentation within the North Arm system. The deltaic surface for these three sites is contiguous indicating that the delta system extended much further seaward during the time of its formation and has since been extensively gutted. The volume of holocene sediment recycled in this area of the fiord is considerable.

North Arm Uppermost delta surface in North Arm valley
M.L. delta UTMG 18W VQ 4447E 79547N
Date 7A86
Elev. 6m below delta surface
Terrace Level Approx. 100
R.S.L. Approx. 100m
M.L. Approx. 100m
Sed. Sample 1 -

Comments:
This appears to be the marine limit delta in the North Arm valley. Its elevation is around 110m as measured from the altimeter (99m with 3.5hrs from last sealevel fix) and the fact that its surface is slightly above the uppermost lake level measured at 94m (1hr from sealevel fix). Map elevation estimate would put it slightly higher at around 120m. There was no prominent break between terrace levels seen from NA8 to this level. However that observation was made from the helicopter and the surfaces are not continuous but have been disconnected by fluvial erosion. It is possible that the entire delta surface prograded from

the marine limit to NA8 and NA5 during a falling sealevel (approx. 30m). Alternatively, the slope may represent subsequent isostatic tilting of a formerly horizontal water plane however, this seems like an unusually steep tilt for such a short distance.

N.A. 9 late Foxe/early Holocene ice contact drift filling tributary valley floor above North Arm.
UTMG 18W VQ 4408E 79580N
Date 7A86
Elev. 325m
Sed. Sample: 1 - coarse grained ice contact/ice stagnation drift.

N.A. 10 early Holocene outwash and recent alluvium sampled from near drainage divide on valley floor above North Arm.
UTMG 18W VQ 4361E 79565N
Date 7A86
Elev. 180m
Sed. Samples: 1 - Late glacial coarse grained outwash gravels on valley floor 9m above current stream level.
2 - Recent alluvium just below sample 1 and just downstream from active side valley alluvial fan.

N.A. 11 Major late Foxe/early Holocene moraine on valley side wall above North Arm.
UTMG 18W VQ 4295E 79532N
Date 7A86
Elev. 395m
Sed. Sample: 1 - sample of till from the 22cm level (Cn horizon) of soil pit excavated into moraine crest.

Comments:
Prominent moraine crest shows fresh morphology which I assume to be typical of the late Foxe/early Holocene deposits in this valley system. This sight shows a very weekly developed cambic B horizon of 6cm. The usefulness of soil colors properties of these last three sites is difficult to judge because they are all coarse grained iron rich materials.

Coutts I. 1 Main ice proximal delta surface of inner Coutts Inlet.
UTMG 18W VQ 4550E 79570N
Date 8A86
Elev.
Terrace Elev. 85m
R.S.L. 80-85m

Comments:
This terrace is a coarse grained ice contact delta that whose surface consists of several large remnants isolated above a surrounding alluvial plane. The delta surface appears to represent the marine limit phase. The alluvial fill consists of a single graded surface much lower than the delta remnants but apparently containing pitted kettle holes of an

ice melt out nature. The alluvial fill is slightly incised by the present river whose flood plane consists of modern alluvium that is graded to the present ice dammed lake level.

Coutts I. 2 Raised delta surface underlain by stoney muds.
UTMG 18W VQ 4612E 79563N
Date 8A86
Elev. 45m?
Terrace Elev. 55m?
R.S.L. sub-littoral muds underlying 55m delta.
M.L. 80-85m?
Sed. Sample: 1 - stoney muds sampled along gully

Comments:
Non fossiliferous stoney mud underlies deltaic sediments of the upper most terrace and the outermost raised marine sequence preserved in Coutts Inlet. It is not clear whether this surface is graded to that of CI1 or represents a subsequent sealevel.

Cape Bowen 1 Moraine dammed lake on forelands north side of Macculloch glacier.
UTMG 18X VR 4830E 80457N
Date 9A86
Elev. 44m
Sed. Sample: 1 - Stoney mud from stream cut in moraine at NE. end of lake.

Cape Bowen 2 and 3 Outwash surface just distal and graded to moraine of CB1
UTMG 18X VR 4840E 80467N
Date 9A86
Elev. 37m-CB2 43m-CB3
Terrace Elev. 39m
R.S.L. ? M.L. ?
Sed. Sample: 1 - CB2 sample of coarse sands from outcrop along stream cut.
2 - CB2 fine sands from same outcrop
3 - CB3 sample of sandy till from 25cm depth in soil pit in moraine segment that projects through delta surface.

Comments:
This outwash sediment accumulated between two moraine sets during a recessional phase (sites 2,3 are distal to the moraine of site 1). The stream cut exposes several tens of meters (laterally) of trough cross stratified sands and fine gravels. The entire system must relate to a pre-late Foxe glaciation because shells in the marine diamict exposed along the coast just outside this moraine system date from 25,660±310 (Beta-16487 considered to be a minimum date). A few scattered limestones were identified in the moraine and outwash deposits here.

Cape Bowen 17Aug85 Coastal bluff exposure of massive glacial marine stoney mud outcropping 3km east of Cape Bowen.
UTMG 18X VR 4838E 80487N
Date 17 August 1985

Elev. 7m Terrace Elevation
R.S.L. ? Sub-littoral deposit
Sed. Sample: 1 - bulk sample of pebbly mud matrix
Shell Sample: 1 - whole valves and valve fragments of Hiatella arctica and Macoma calcarea excavated from outcrop or collected from float overlying fossiliferous part of section.
Radiocarbon: 25660±300 Beta-16487
Amino Acid: Free 0.22± Total 0.036± H. arctica

Comments:
This unit represents the last major glacial depositional period of the Cape Bowen forelands. The radiocarbon date is clearly a minimum date and the deposit probably correlates to the Kogalu member of the Clyde Foreland Formation (Miller et.al., 1977, Miller, 1985) and the Eclipse glaciation of Bylot Island (Klassen, 1985). Foreign erratics including striated carbonates compose a minor (2% or less) but significant component of the coarse fraction. This unit appears to outcrop along much of the coastal section between Cape Bowen and Cape Macculloch.

Cape Macculloch 1
Eroded deltaic complex outcropping along the coast 2km south of Cape Macculloch.
UTMG 18X VR 4935E 80417N
Date 9A86
Elev. Terrace Elev. upper surface=52m
R.S.L. 45m+ M.L. ?
Sed. Sample: 1 - delta sands from gully outcrop.
Shell Sample: 1 - CM1; valve fragments of numerous species including Hiatella, Mya, Macoma, Serripes, Chlamys islandica, and gastropods collected from lower float in muddy sand 5-10m above sealevel.
2 - CM1a; shell fragments from well sorted sands near top of section (41m) collected for A.A. analysis.
3 - CM1b; fragments and 1 whole valve of H. arctica from muddy basal part of section (3m). for A.A. analysis
T.L. Sample: 1 - C.M.1b; collected in film canister from freshly cleaned exposure of foreset sands overlying CM1b.

Comments:
Much of outcrop consists of slumped blocks of planer bedded sands so it is difficult to find foreset directions to measure. The surface of the deposit is so eroded that it shows no true terrace form therefore it is difficult to determine the precise sealevel of the deposit. This irregular surface is also covered with abundant larger clasts in colluvium so it appears that there may be no in situ topset beds remaining. It is not clear whether there are more than one stratigraphic unit in this raised section therefore samples 1a and 1b were collected for amino acid analysis. Scattered limestones were also observed within this deposit.

Cape Macculloch 2
Coastal delta exposure 10 km south of Cape Macculloch
UTMG 18X VR 4955E 80333N
Date 9A86
Elev. Approx. 10m

Terrace Elev. 46m R.S.L. 46m? M.L.?
Sed. Sample: 1 - delta sands
2 - coarse gravely beds
Shell Sample: 1 - whole valves and valve fragments primarily of H. arctica, Macoma calcarea, and Mya truncata collected from float

Comments:
Wave cut coastal exposure of deltaic complex similar to Cape Mac. 1 (possibly the same delta) however this locality is much less eroded than CM1. A number of foreset beds appear to be in place as well as topset gravels however there is limited expression of a true delta surface at this site. Scattered limestones also present here.

Cape Macculloch CM 3
Prominent moraine and adjacent deltaic surface 8km inland (west) of CM2.
UTMG 18X VR 4881E 80352N
Date 9A86
Elev. Moraine=60m, Delta surface=33m
Sed. Samples: 1 - sample from Cn horizon at 35cm depth from soil pit excavated in moraine crest.
2 - delta sands from stream cut in terrace that appears to grade to the moraine.

Comments:
Major moraine system that stands in relief to surrounding deltaic terrace surface. Soil pit exposes multiple B horizon with strong cambic B 8cm thick with a diffuse cambic B extending to 16cm thickness below 2cm A horizon.

Cape Coutts
Holocene beach strandline sequence.
UTMG 18X VR 4991E 80225N
Date 9A86
Elev. 9m
Beach Elev.=10m Holocene M.L.=12m
Sed. Sample: 1 - beach sands collected from stream cut of holocene raised beaches
2 - heavy mineral concentrate in eolian section of raised beach sequence.
Organics: 1 - organic matter (stalks of fucus) from beach strata within outcrop

Comments:
Organics should probably date the 10m sealevel. This locality shows a complete 12m sequence of beach ridges which probably represent the entire holocene raised section on this foreland. The fresh morphology of the beach sequence stands in stark contrast to the older (infinite radiocarbon dates) eroded glacimarine and deltaic sediments into which they are cut. Therefore it is very easy to recognize the extent of the holocene marine transgression along most of the outer coast of this area.

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GRAIN SIZE ANALYSIS:

The grain size analyses presented below are in the order in which they appear in the report and are thus grouped by geographic area.

SAMPLE ABBREVIATIONS AND TABLE OF CONTENTS:

The first sample number listed for each grain size analysis is the abbreviation taken from the field sample list above. Those abbreviations are as follows;

ABBREV.	LOCALITY	PAGE #
CA	Cambridge Fiord	2-46 - 2-47
FB	Feachem Bay	2-47
FV	Feachem Valley	2-47 - 2-48
TS	Tay Sound	2-48 - 2-49
PB	Paquet Bay	2-50 - 2-55
NA	North Arm of Coutts Inlet	2-55 - 2-56
CI	Coutts Inlet	2-56
CB	Cape Bowen	2-56 - 2-57
CM	Cape Macculloch	2-57
CC	Cape Coutts	2-57

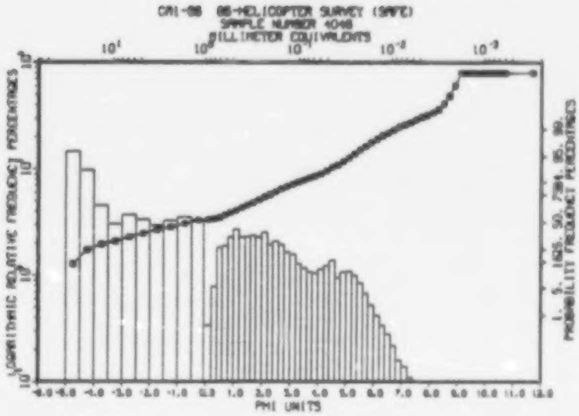
SUMMARY SIZE FRACTION PERCENTAGES AND MOMENT STATISTICS
(continued)

SAMPLE ID	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	SD Ø	SK	KU
CA1-86	4046	45.32	42.42	12.26	11.90	0.36	-0.35	3.43	0.22	1.89
CA2-86	4050	66.06	32.98	0.96	---	---	-2.46	2.45	0.85	3.84
CA3-86	4047	27.31	71.91	0.78	---	---	-0.17	1.53	0.73	8.12
CA4-KT-86	4056	0.02	98.03	1.95	---	---	2.38	0.77	3.87	31.95
CA4-2-86	4048	48.56	36.10	15.34	11.77	3.57	-0.57	4.49	0.43	2.16
CA5-86	4049	52.44	46.44	1.12	---	---	-1.80	2.87	0.14	2.48
CA6-86	4295	2.02	13.77	84.21	49.72	34.49	6.83	3.16	-0.60	3.64
CA7-86	4296	2.99	42.85	54.16	37.18	16.98	4.80	3.01	0.31	3.50
CA20-1-86	4297	4.91	46.82	48.27	38.55	9.72	4.27	3.00	-0.44	5.91
CA20-2-86	4298	0.00	99.02	0.98	---	---	1.80	0.62	4.02	36.59
FB1-2-86	4301	35.75	27.76	36.49	15.92	20.57	1.87	5.79	0.16	1.71
FV1-1-86	4299	26.59	39.08	34.33	17.91	16.42	2.44	4.73	0.24	2.16
FV1-2-86	4309	42.36	57.17	0.47	---	---	-0.67	2.14	-0.17	2.33
FV2-86	4300	25.12	38.10	36.79	16.29	20.50	2.88	5.10	0.27	2.07
FV4-1-86	4315	0.47	97.13	2.40	---	---	2.33	0.86	3.00	30.06
FV4-2-86	4317	0.15	97.55	2.30	---	---	2.26	0.84	3.96	29.93
CJ1-86	4305	24.22	73.53	2.25	---	---	0.19	2.24	0.11	4.83
TS1-86	4257	5.07	93.97	0.96	---	---	1.19	1.20	-0.32	13.81
TS2-86	4258	0.92	15.61	83.47	40.51	42.96	7.24	3.20	-0.55	2.85
TS4A-86	4259	0.44	55.83	43.73	34.92	8.81	4.31	2.34	1.43	5.50
TS6A-86	4260	5.81	17.74	76.45	57.61	18.84	5.51	3.40	-0.62	4.12
TS6*B-86	4261	0.72	17.07	82.21	64.50	17.71	5.84	2.51	0.55	3.76
TS6C-86	4262	2.37	16.14	81.49	63.20	18.29	5.84	2.83	-0.26	5.10
TS6D-86	4263	0.05	53.96	45.99	36.30	9.69	4.72	2.14	1.86	6.05
PB3-1-86	4264	0.00	94.37	5.63	---	---	2.86	1.24	3.26	13.89
PB3-2-86	4265	0.20	25.69	74.11	64.13	9.98	5.33	2.00	1.15	5.18
PB3-3-86	4266	8.69	90.37	0.95	---	---	0.78	1.34	0.50	7.90
PB3-4-86	4267	34.09	65.54	0.37	---	---	-0.35	1.81	-0.29	3.11
PB5-1-86	4268	0.00	89.66	10.34	---	---	3.48	1.40	2.66	8.89
PB5-2-86	4269	0.00	8.79	91.21	69.36	21.85	6.49	2.21	0.96	3.22
PB5-4-86	4270	5.30	84.37	10.34	---	---	2.21	2.31	0.86	5.31
PB6-1-86	4271	0.19	20.50	79.31	59.05	20.26	6.09	2.45	0.86	3.20
PB7-1-86	4272	0.00	0.33	99.67	34.74	64.93	9.08	2.07	-0.19	2.06
PB7-2-86	4273	56.20	40.57	3.23	---	---	-1.24	2.70	1.09	4.95
PB9-86	4274	23.97	72.91	3.12	---	---	0.36	2.45	0.22	4.12
PB10-86	4275	65.45	33.64	0.91	---	---	-2.09	2.38	0.87	3.98
PB11-86	4276	44.30	43.68	12.02	11.15	0.87	-0.06	3.34	0.34	2.19
PB14-1-86	4277	3.69	93.53	2.78	---	---	1.77	1.35	1.06	11.19
PB14-2-86	4278	75.59	21.50	2.91	---	---	-2.43	2.73	1.80	6.64
PB15-1-86	4279	27.60	25.81	46.60	15.35	31.25	3.86	5.34	0.13	1.50
PB15-2-86	4280	9.89	11.36	78.76	51.12	27.64	5.75	4.02	-0.79	3.39
PB18-1-86	4281	4.46	12.41	83.13	69.84	13.29	5.35	3.00	-1.09	6.82
PB18-2-86	4282	0.34	6.45	93.21	64.28	28.93	6.92	2.42	0.30	3.15
PB18-3-86	4283	0.00	36.84	63.16	55.43	7.73	4.80	1.78	2.12	7.59
PB21-86	4284	37.62	60.87	1.52	---	---	-0.65	2.02	0.46	5.31
PB23-1-86	4306	28.80	68.95	2.25	---	---	-0.08	2.12	0.52	5.11
PB23-2-86	4307	0.59	56.35	43.06	38.06	5.01	4.13	1.79	1.70	9.07
PB25-1-86	4285	32.94	65.98	1.08	---	---	-0.01	2.30	-0.26	2.85
PB25-2-86	4286	1.23	97.24	1.53	---	---	1.95	1.01	1.07	15.45

SUMMARY SIZE FRACTION PERCENTAGES AND MOMENT STATISTICS

(continued)

SAMPLE ID	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	SD Ø	SK	KU
PB25-3-86	4287	0.00	70.12	29.88	28.41	1.47	3.69	1.18	2.03	9.20
PB25-4-86	4288	3.14	96.55	0.31	---	---	0.81	0.85	-0.31	12.13
PB25-5-86	4289	56.66	43.00	0.33	---	---	-1.54	2.12	0.09	2.15
PB28-1-86	4290	0.97	17.40	81.63	52.36	29.27	6.40	2.93	0.33	2.73
PB30-1-86	4291	0.00	92.74	7.26	---	---	2.84	1.20	3.16	14.03
PB30-2-86	4292	0.06	12.57	87.37	66.42	20.95	6.21	2.37	0.89	3.11
PB30-3-86	4293	25.72	44.92	29.36	19.84	9.52	2.13	4.09	0.47	2.66
PB32-86	4294	57.70	39.64	2.67	---	---	-2.01	3.12	0.68	3.42
PB33-1	4053	36.26	56.27	7.46	5.47	1.99	0.07	2.96	0.60	3.71
PB33-2	4054	32.34	63.90	3.76	---	---	0.26	2.34	0.94	4.97
NA-2-86	4303	11.83	32.72	55.45	37.65	17.81	4.32	4.02	-0.27	3.15
NA9-86	4051	52.08	40.20	7.72	7.31	0.41	-0.73	2.86	0.70	3.04
NA11-86	4052	68.32	26.76	4.92	4.82	0.10	-2.33	3.33	0.78	2.39
CI1-86	4055	59.40	40.08	0.52	---	---	-2.11	2.64	0.28	2.28
CI-2-86	4302	8.97	17.49	73.54	42.80	30.73	5.75	4.16	-0.52	2.75
CB1-86	4304	14.94	33.90	51.16	20.71	30.45	4.75	4.84	0.05	1.83
CB2-1-86	4310	25.03	72.02	2.95	---	---	0.68	2.04	0.49	3.86
CB3-86	4311	30.87	53.45	15.68	13.46	2.22	0.86	3.42	0.04	2.53
CM2-1-86	4312	0.00	66.21	33.79	27.16	6.62	3.94	2.06	2.17	7.85
CM3-1-86	4314	36.80	54.82	8.38	7.38	1.01	0.31	2.92	0.23	2.57
CM3-2-86	4308	0.34	95.87	3.79	---	---	2.41	1.10	2.88	17.21
CC1-86	4313	0.00	99.04	0.96	---	---	1.82	0.50	3.23	32.63
CC2-86	4316	0.00	99.37	0.63	---	---	1.88	0.49	8.44	104.85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PROBABILITY FREQUENCY PERCENTAGES
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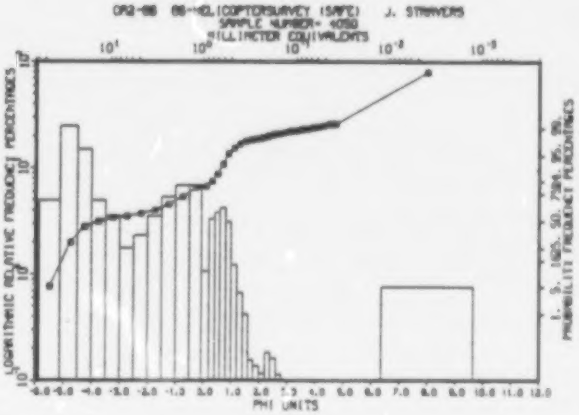
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PROBABILITY FREQUENCY PERCENTAGES
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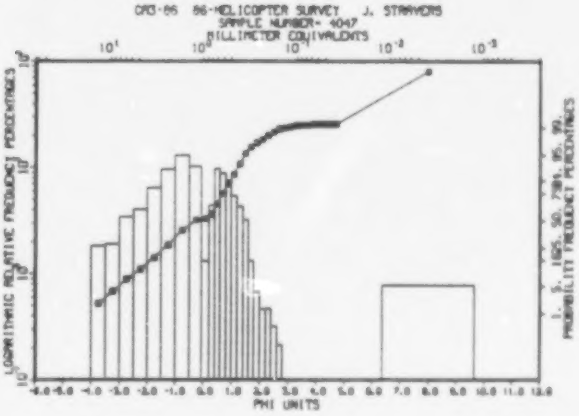
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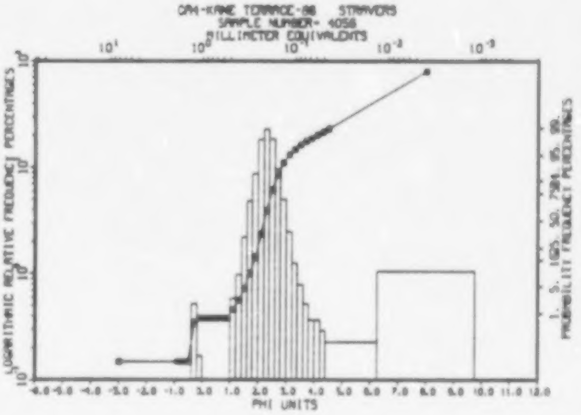
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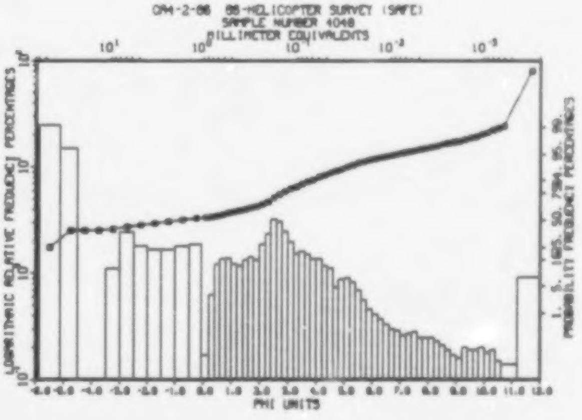
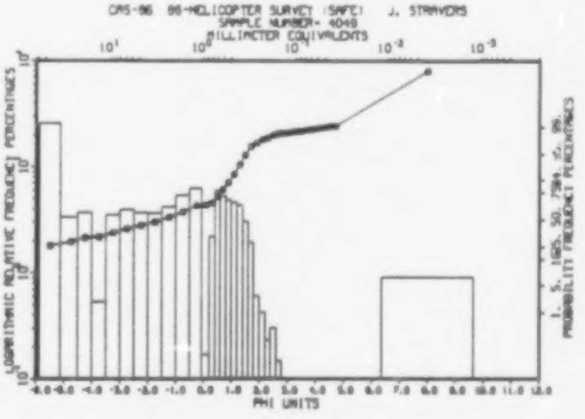
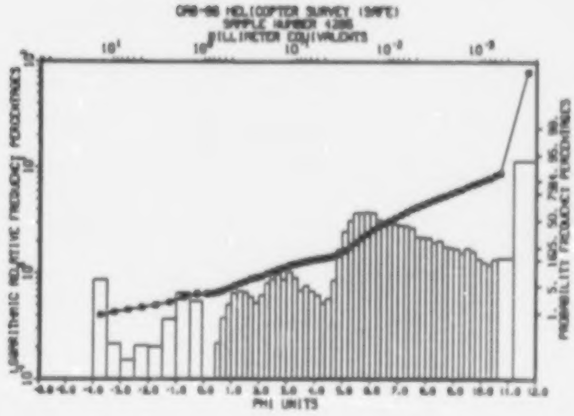
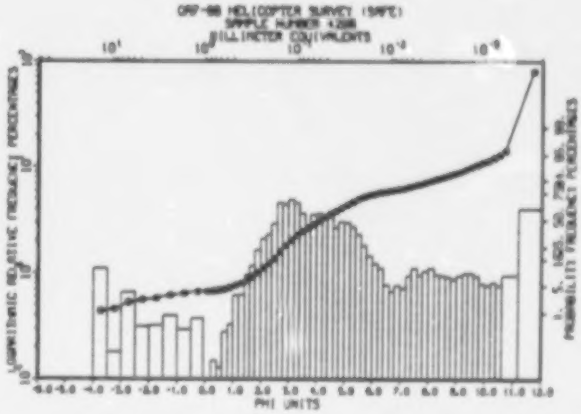
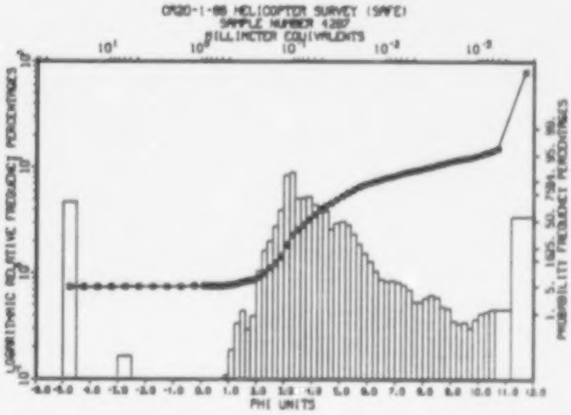
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16 25. 50. 75 84. 95. 99.
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

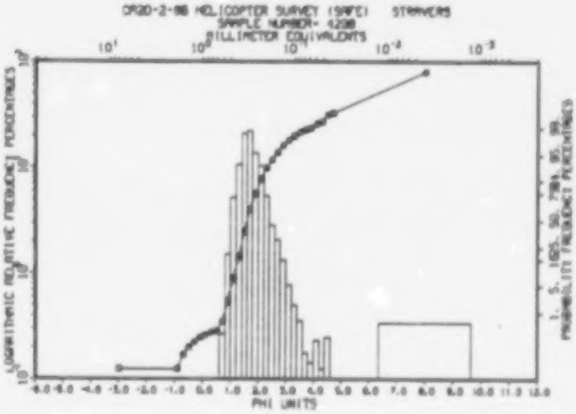

CR4-2-86 86-HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4048
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16 25. 50. 75 84. 95. 99.
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

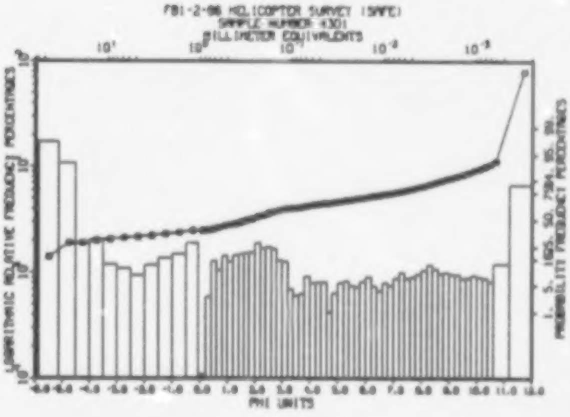

CR5-86 86-HELICOPTER SURVEY (SAFE) J. STRAVERS
SAMPLE NUMBER- 4049
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16 25. 50. 75 84. 95. 99.
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

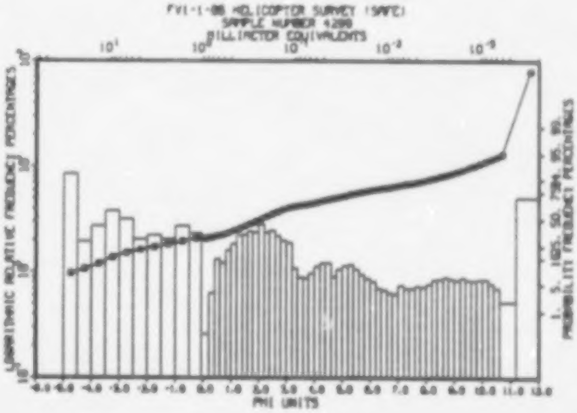

CR8-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4286

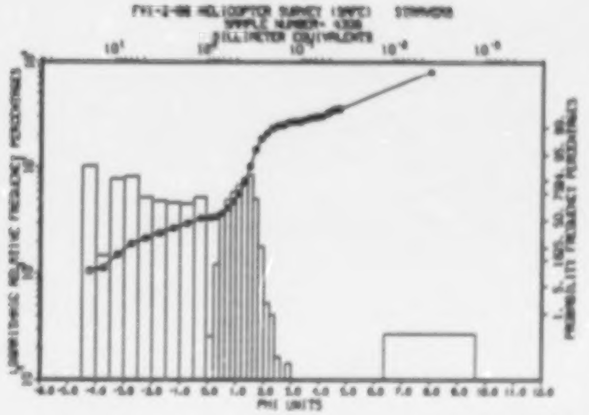

CR7-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4288

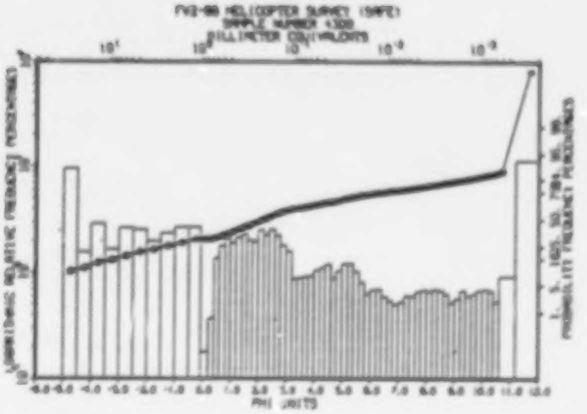

CR20-1-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4287

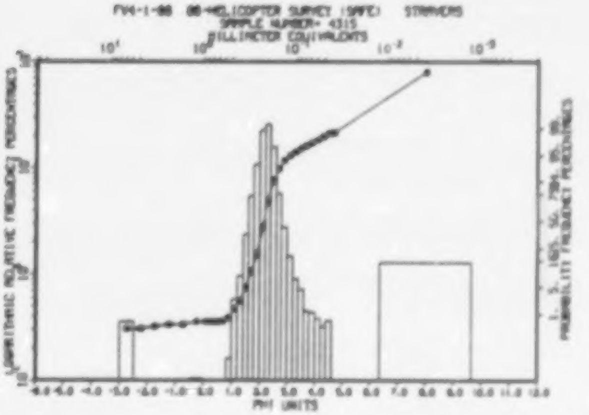

CR20-2-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER= 4298

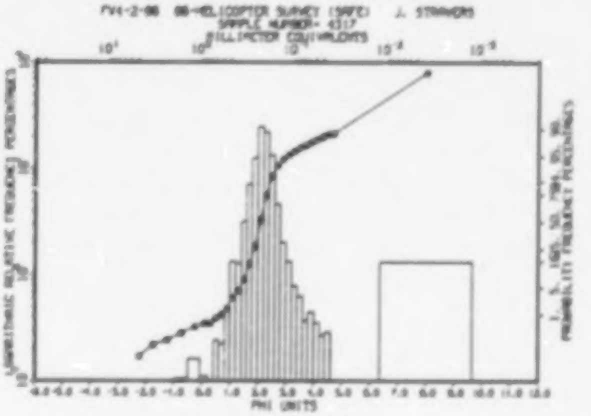

FB1-2-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4301

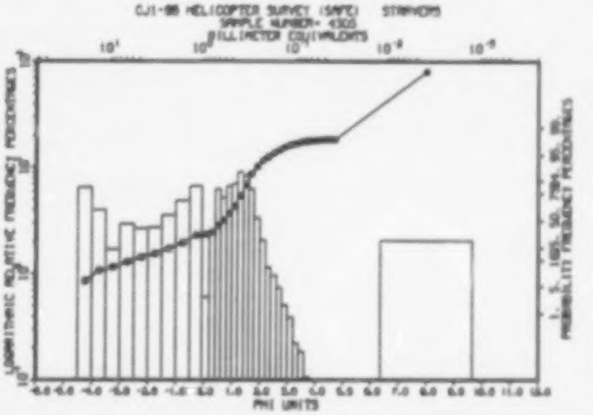

FV1-1-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4299

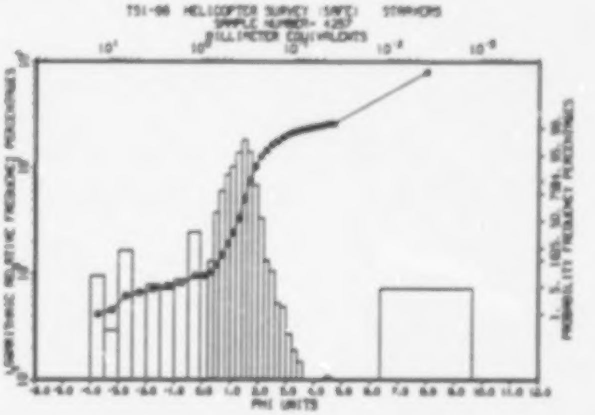

FV1-2-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER= 4308
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

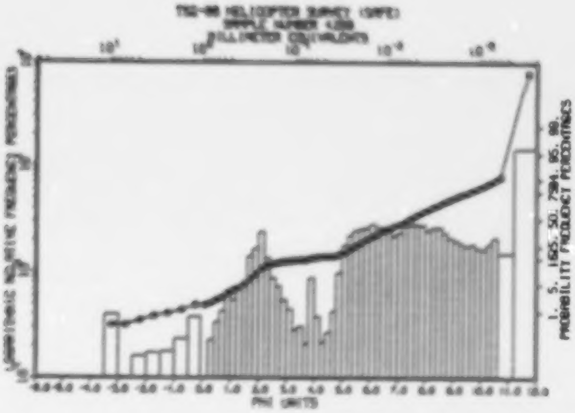

FV2-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4309
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

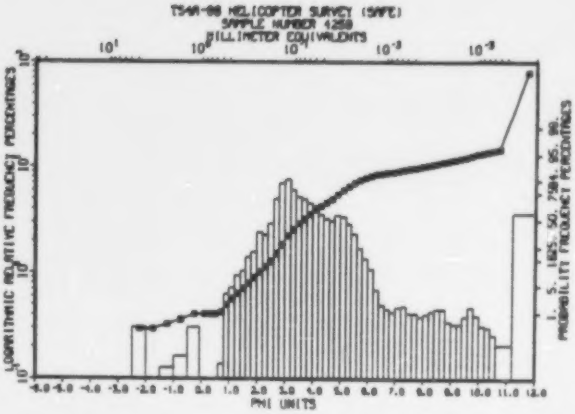

FV4-1-88 88-HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER= 4315
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

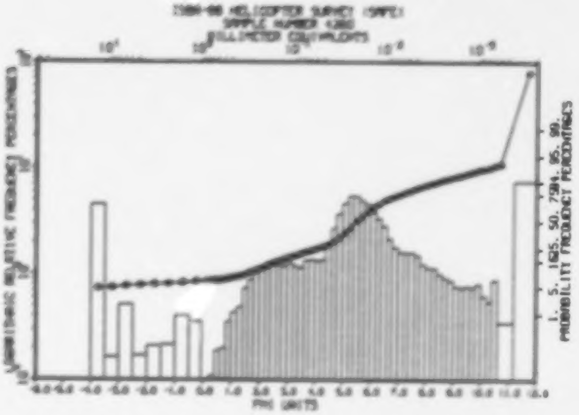

FV4-2-88 88-HELICOPTER SURVEY (SAFE) J. STRAVERS
SAMPLE NUMBER= 4317
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

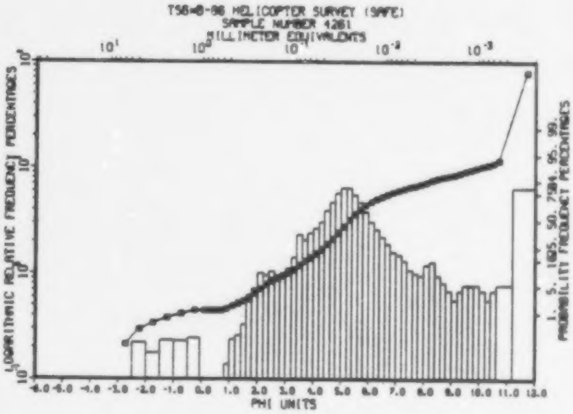

CJ1-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER= 4305
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

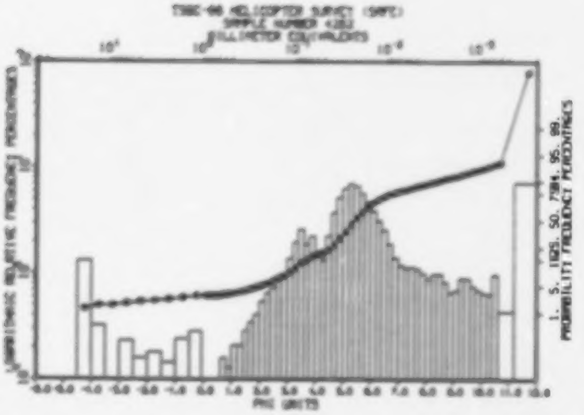

TS1-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER= 4257
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

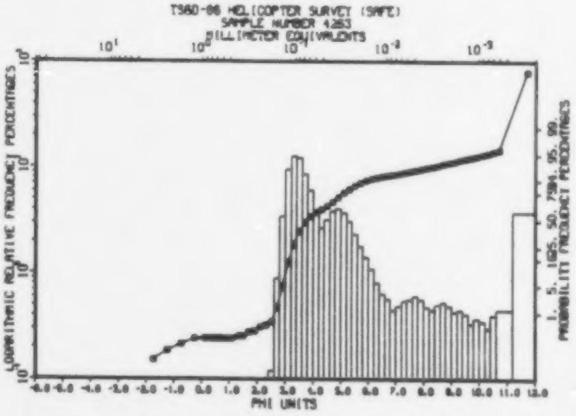

TS3-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4258
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

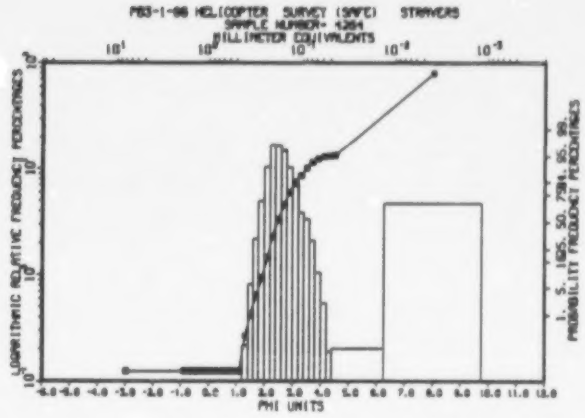

TS4A-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4259
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

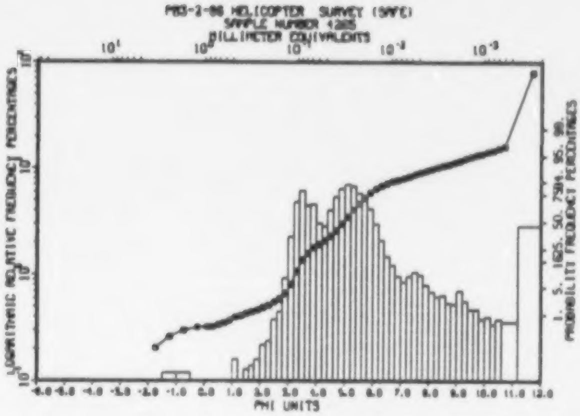

HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4260
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

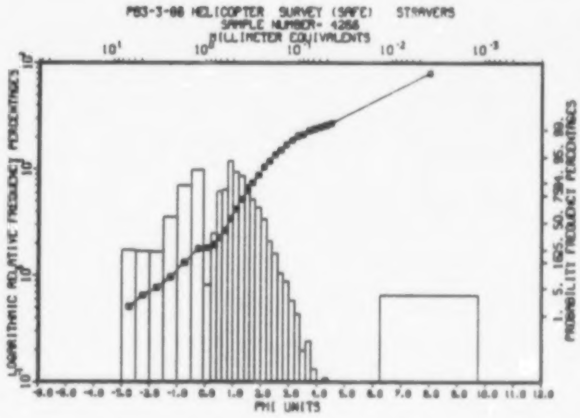

TS6-B-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4261
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

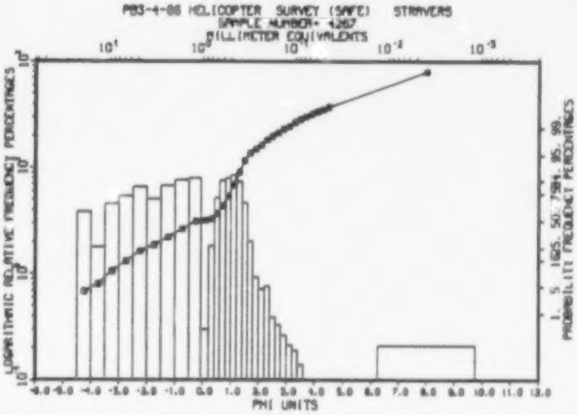

HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4262
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

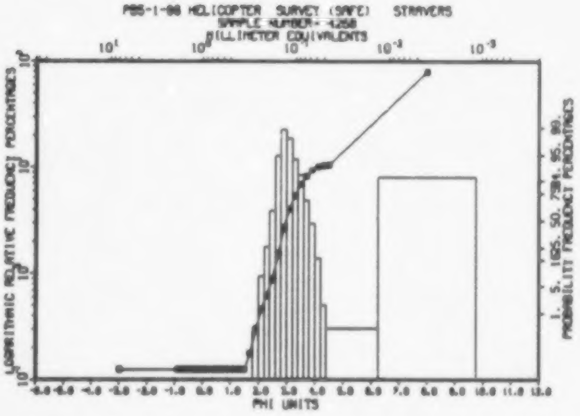

TS6D-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4263
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

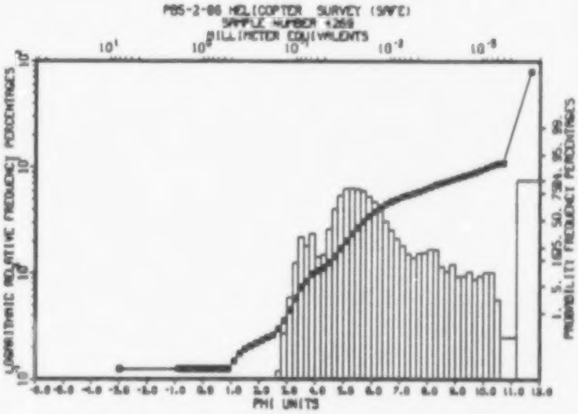

PB3-1-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4264
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS


PB3-2-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4265
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS

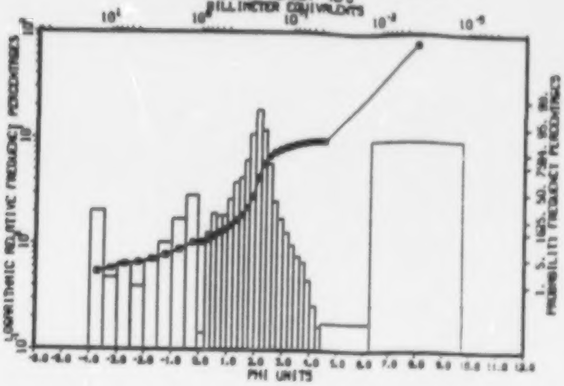

PB3-3-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4266
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS


PB3-4-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4267
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS

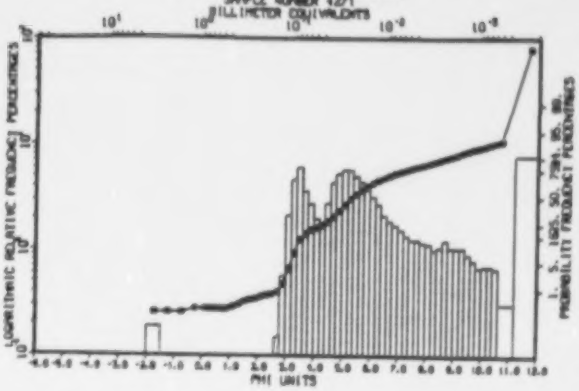

PB5-1-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4268
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS


PB5-2-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4269
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS

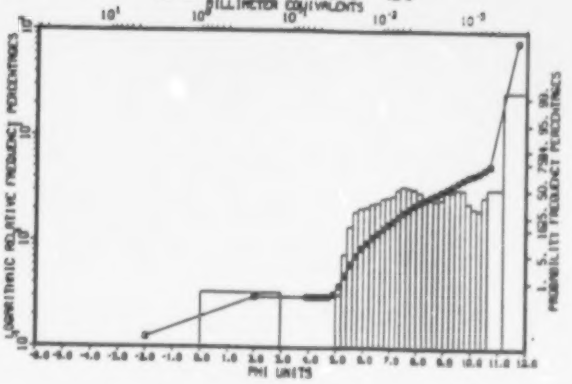
PB6-4-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4270



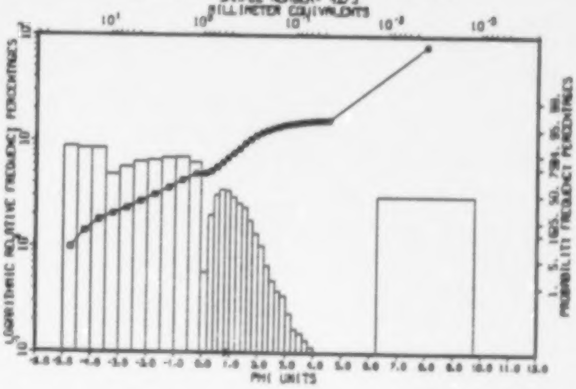
PB6-1-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4271



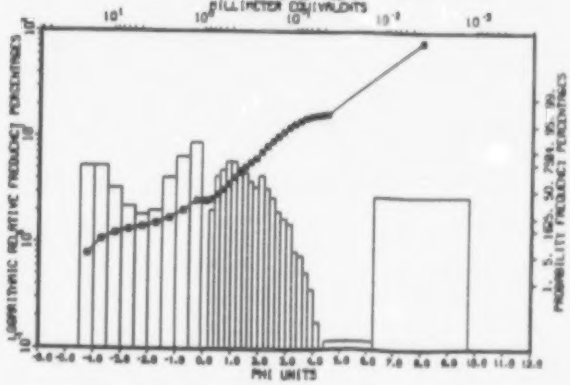
PB7-1-88
88-HELICOPTER SURVEY (SAFE) 4272



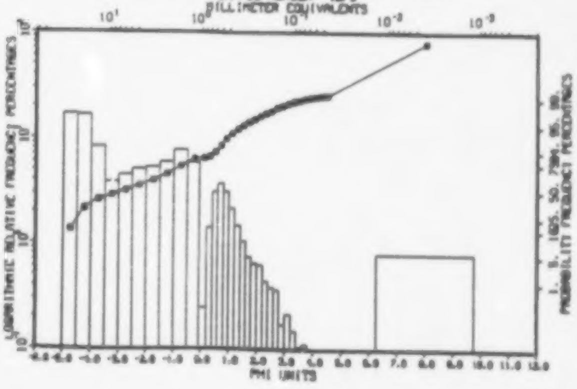
PB7-2-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4273



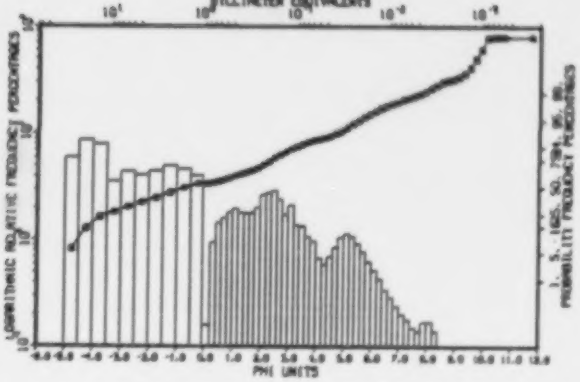
PB9-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4274



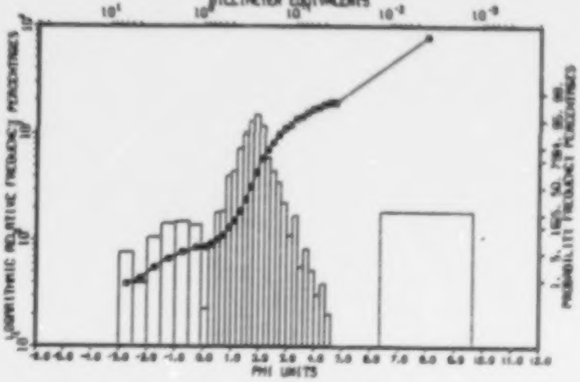
PB10-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4275



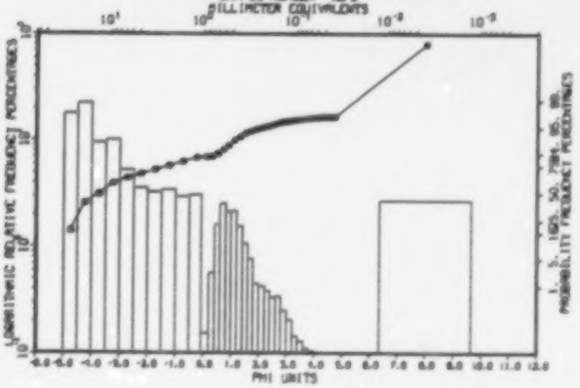
PB11-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4276



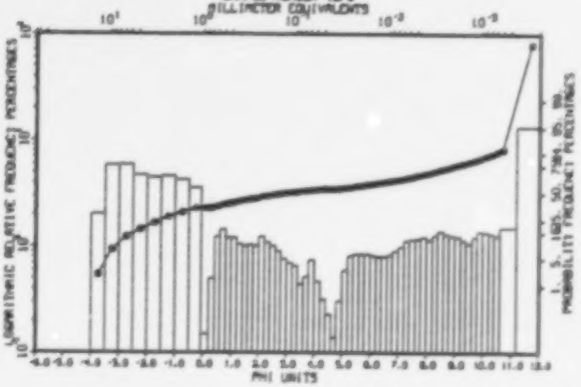
PB14-1-88 HELICOPTER SURVEY (SAFE) STRAYERS
SAMPLE NUMBER- 4277



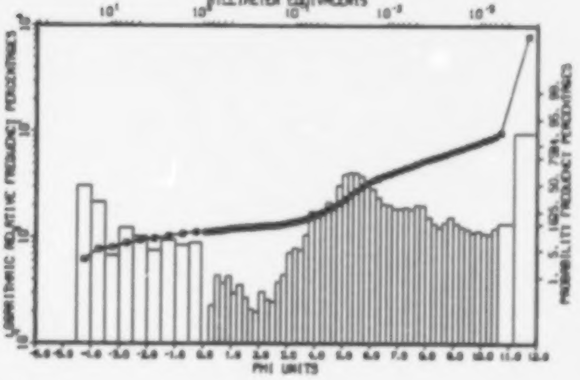
PB14-2-88 HELICOPTER SURVEY (SAFE) STRAYERS
SAMPLE NUMBER- 4278



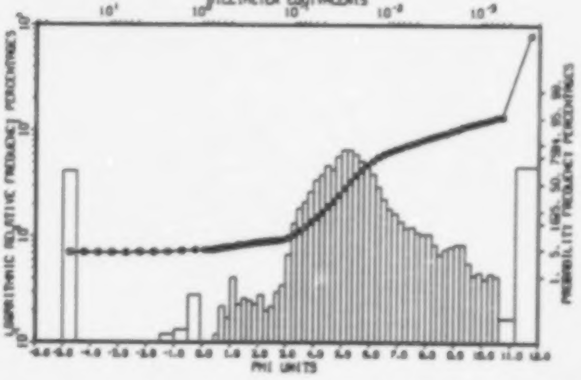
PB15-1-88 HELICOPTER SURVEY
SAMPLE NUMBER 4279

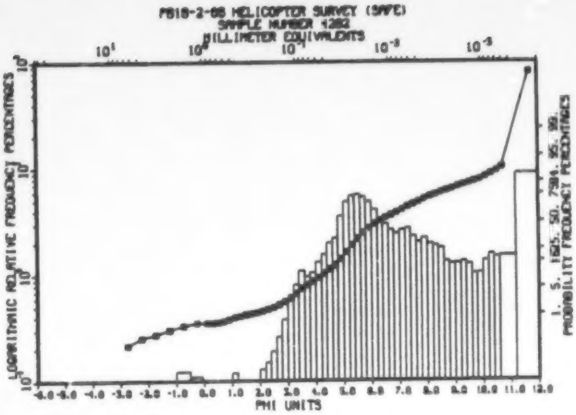


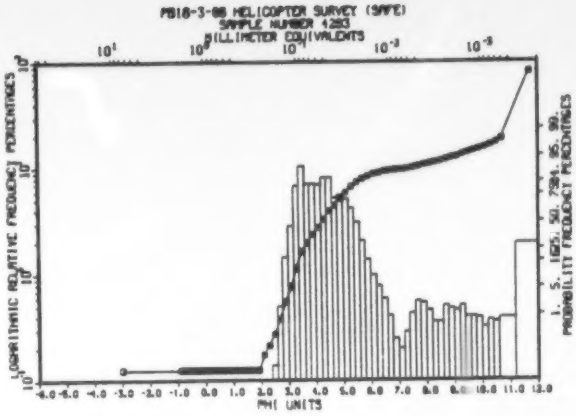
PB15-2-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4280

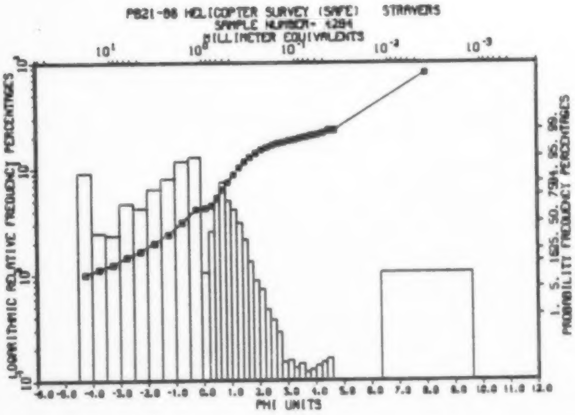


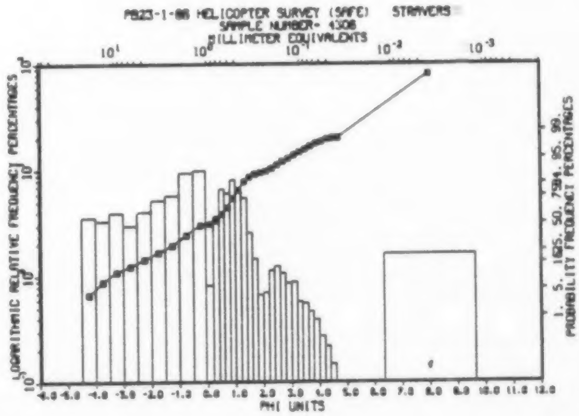
PB10-1-88 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4281

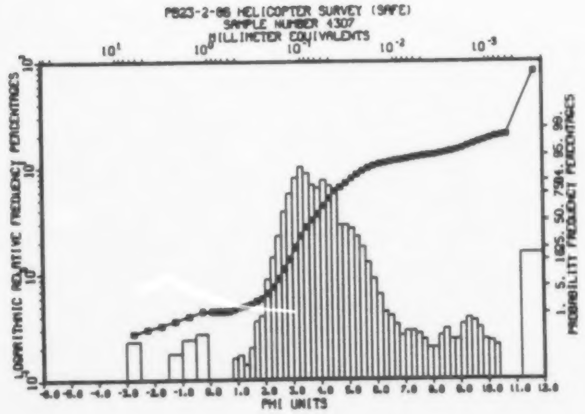


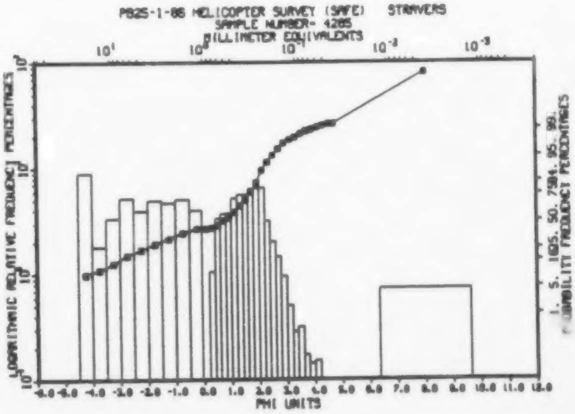

PB18-2-86 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4282
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0


PB18-3-86 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4283
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0

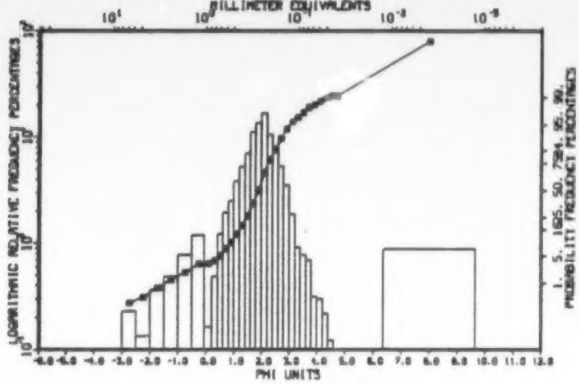

PB21-86 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4284
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0


PB23-1-86 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4306
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0

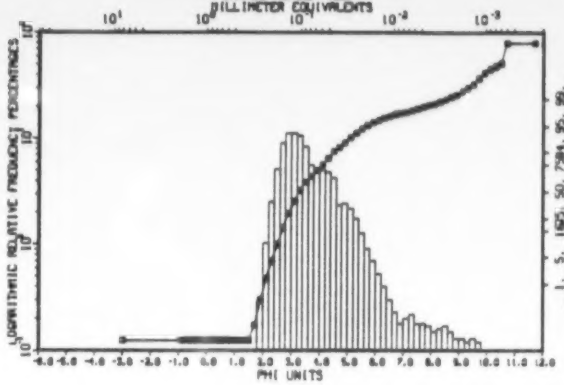

PB23-2-86 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4307
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0


PB25-1-86 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4285
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0

PB25-2-86 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4286



PB25-3-86 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4287



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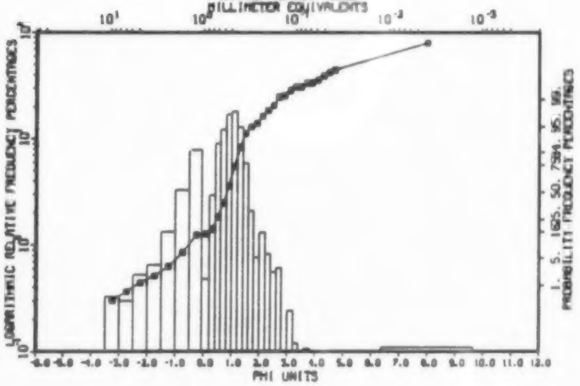
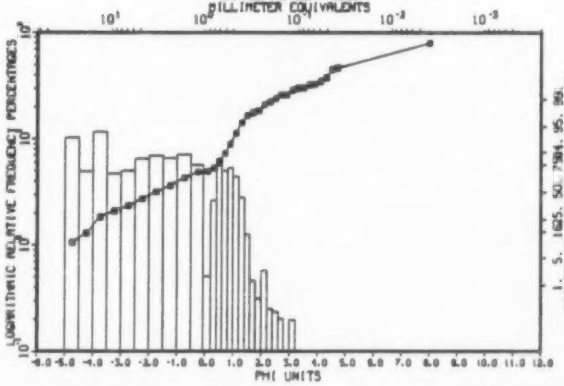
SAMPLE NUMBER- 4288



PB25-5-86 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4289



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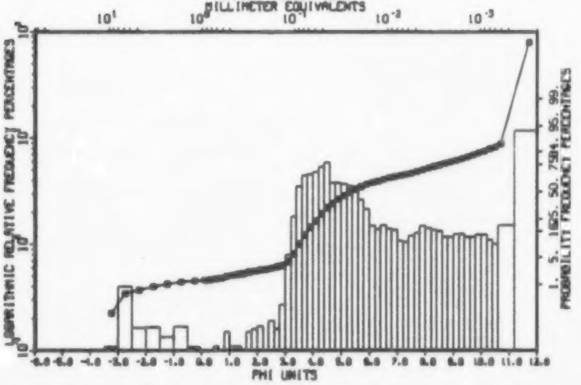
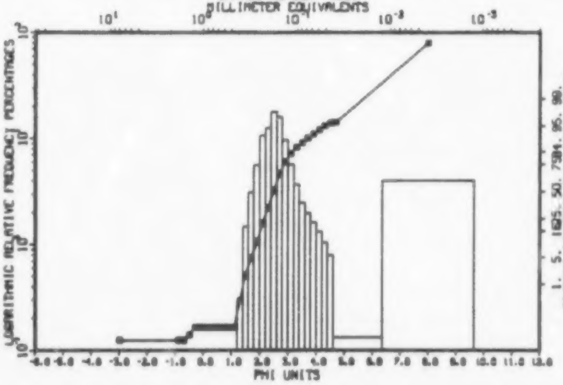


PB30-1-86 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4291



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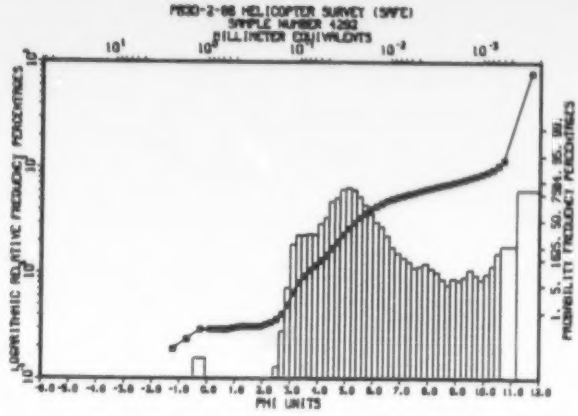
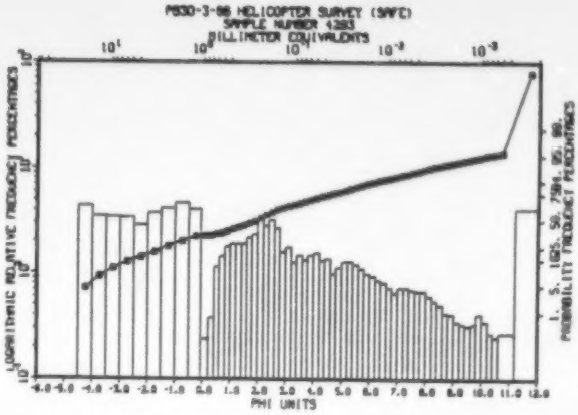
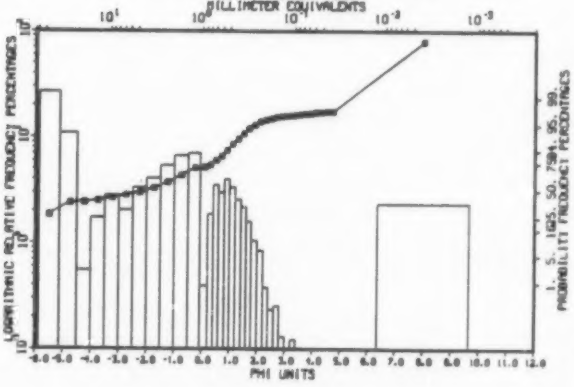
SAMPLE NUMBER 4292



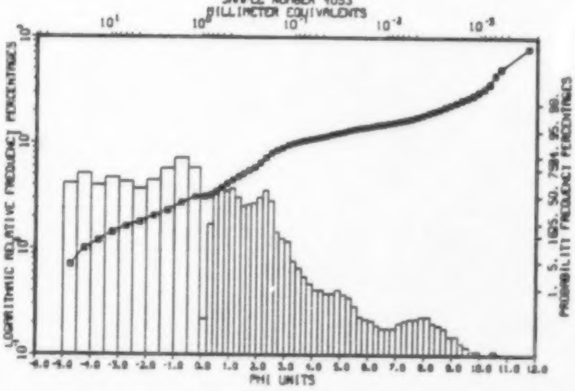
PB30-3-86 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4293



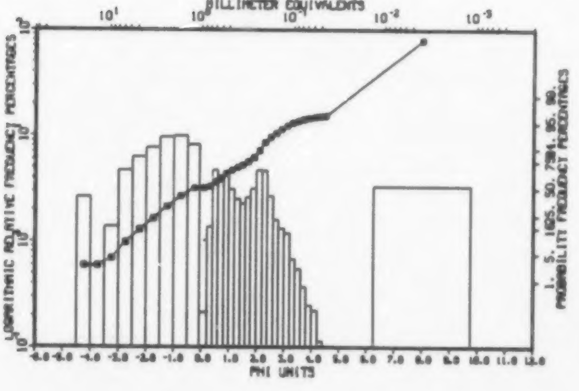
PB32-86 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4294



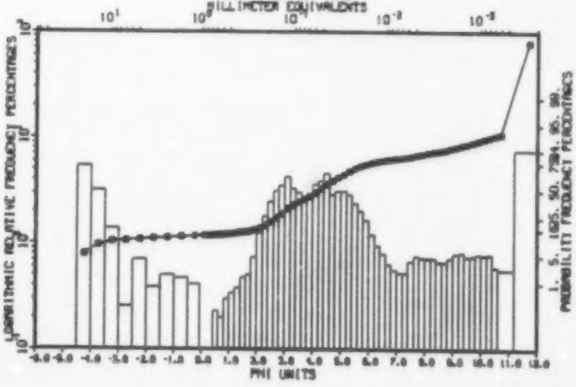
PB33-1 MORAINE-86
SAMPLE NUMBER 4053

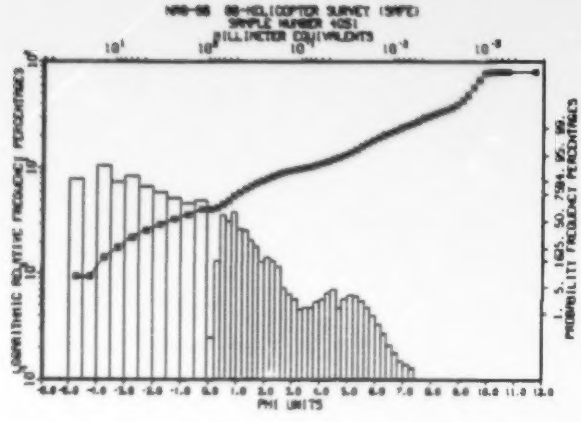


PB33-2 OUTWASH-86 J. STRAVERS
SAMPLE NUMBER- 4054



MA-2-86 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4303




NA9-86 86-HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4051
MILLIMETER EQUIVALENTS
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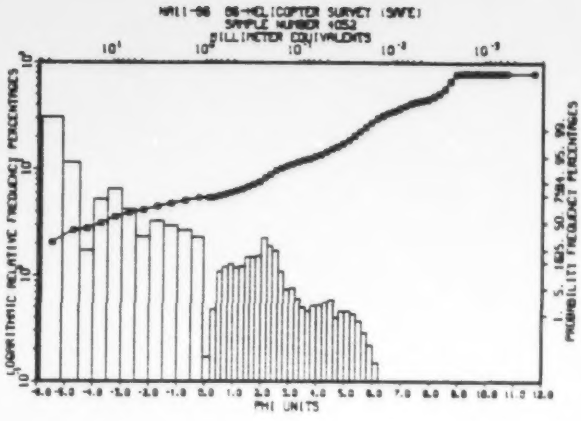
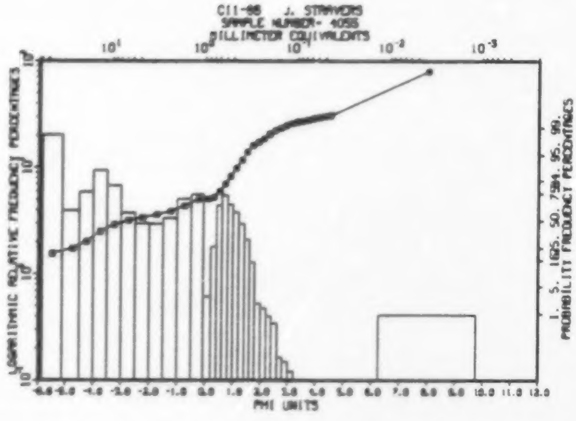
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0


NA11-86 86-HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4052
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0


CI1-86 J. STRAVERS
SAMPLE NUMBER- 4055
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS
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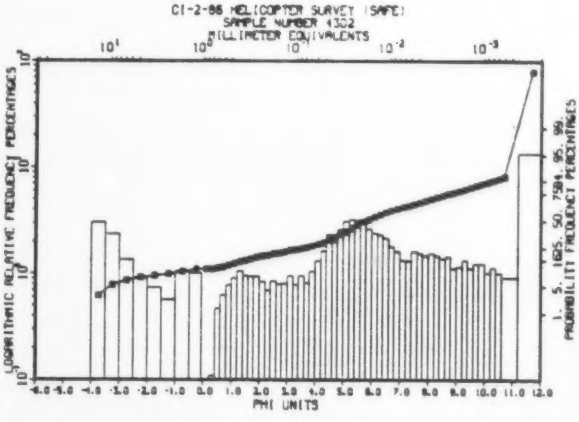
CI-2-86 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4302
MILLIMETER EQUIVALENTS
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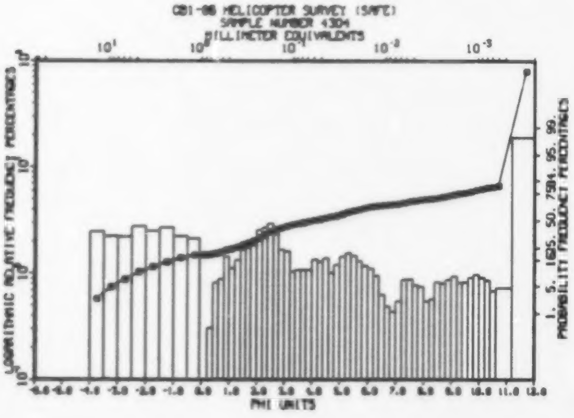
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0


CB1-86 HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4304
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS
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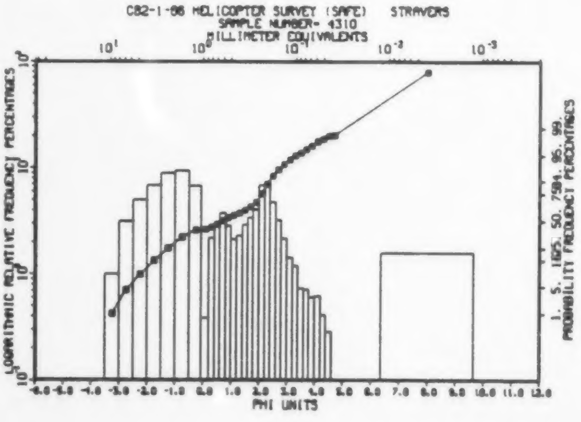
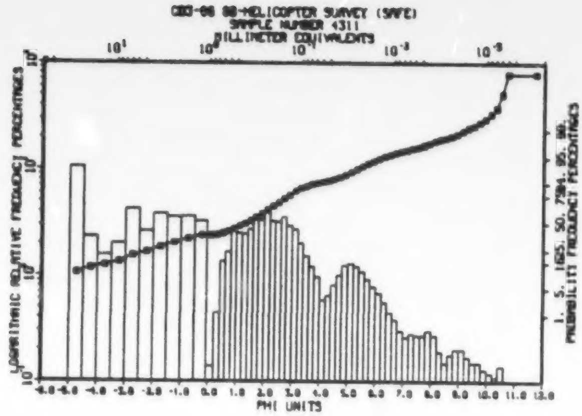
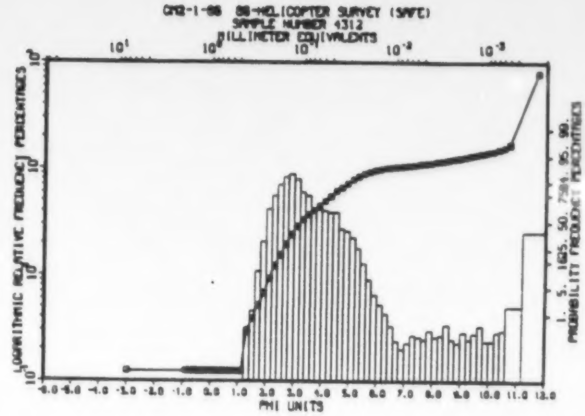
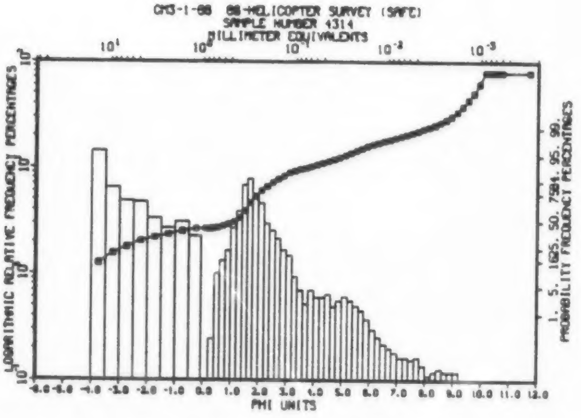
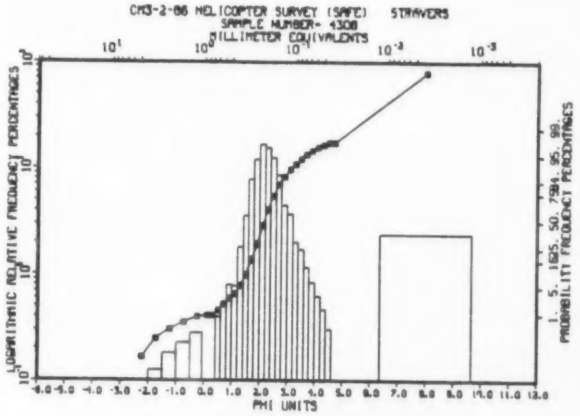
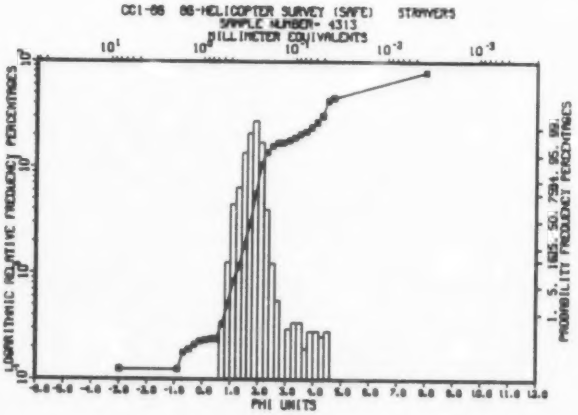

CB2-1-86 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4310
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS
-6.0 -5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0

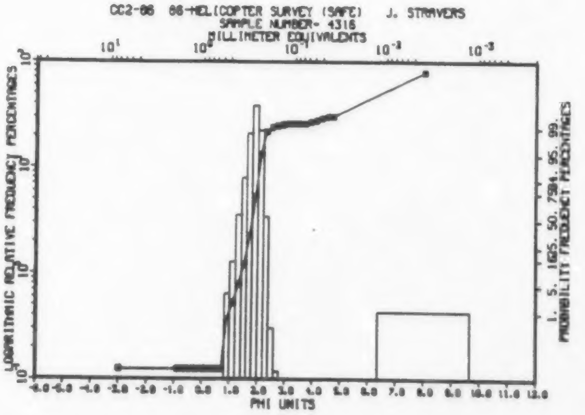

CB3-88 88-HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4311
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS


CM2-1-88 88-HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4312
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS


CM3-1-88 88-HELICOPTER SURVEY (SAFE)
SAMPLE NUMBER 4314
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS


CM3-2-88 HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4308
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS


CC1-88 88-HELICOPTER SURVEY (SAFE) STRAVERS
SAMPLE NUMBER- 4313
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS


CC2-88 88-HELICOPTER SURVEY (SAFE) J. STRAVERS
SAMPLE NUMBER- 4316
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS

CHAPTER 3

COASTAL MORPHOLOGY AND SEDIMENTATION EASTERN BAFFIN AND BYLOT ISLANDS, NWT.

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INTRODUCTION

This report presents a summary of coastal geological information collected in 1985 from selected sites along eastern Bylot and Baffin Islands, NWT. It is the third in a series of data reports which has summarized beach survey and sediment information from this region. The first report outlined the field data collected, prior to and during 1979, as part of the Eastern Arctic Marine Environment Study (EAMES) program (McLaren et al. 1981); the second report listed and briefly described the sediment texture of samples collected in 1983 in conjunction with the Sedimentology of Arctic Fiords Experiment (SAFE) (Syvitski et al., 1984).

The purpose of this report is to document the beach sites surveyed in 1985 (Fig. 1, Table 1), and to provide a more complete listing of all beach surveys completed in the region since 1979 (Appendix 1). The report also documents the sediment samples collected in 1985 (Fig.1-6, Tables 1,2) including the results of grain size analyses (Appendix 2), and photographs of epoxy resin peels made from sediment cores (Fig.7, Appendix 3). General comments about shoreline changes and coastal sediment composition observed in 1985 are presented along with a more detailed description of shoreline morphology and sediment structure at two coastal environments: (1) a sand barrier beach, and (2) a shore fringed by perennial snowbanks.

METHODOLOGY

The 1985 land-based beach survey and sediment sampling program was conducted using a Polar Continental Shelf Project (PCSP) sponsored Bell 206B helicopter which operated out of the communities of Pond Inlet and Clyde River, Baffin Island, NWT. (Fig. 1).

Beach Surveys Between 1979 and 1985 beach sites were established, ie. monumented and surveyed, along Bylot and Baffin Islands (Appendix 1) to provide information on the across shore morphology and sediment character of representative coastal types. In 1985 our attention was focused on the beaches fringing the coastal forelands of eastern Baffin Island and the sandur shores of eastern Bylot Island (Fig. 1, Table 1). Measurements were completed using conventional survey techniques with either a level, transit and stadia rod or range poles and abney level. Each survey line was aligned perpendicular to the coastline and extended seaward to hip wader water depth,from a benchmark located on the emerged shore, or from the backbarrier lagoon or stream channel (Fig. 2). In addition aerial video surveys were completed along the northeastern Baffin coastline, including the inner fiords (Fig. 1) where previous video coverage was poor or not completed during the EAMES Project (Sempels, 1982, McLaren and Barrie, 1985).

Sediment Sampling Sediment was collected from specific geomorphological features or representative across shore zones as (1) grab samples, from surface or subsurface cut sections, using a trowel or plastic vial, and (2) hand push-cores using variable lengths of plastic core liner (Table 2). The longest core collected in 1985 was 0.6m. Frozen ground restricted the penetration of cores and the digging of sections.

To obtain a better visual record of the detailed sedimentary structures, grain size characteristics and distribution of heavy minerals, epoxy resin peels were made from each of the push cores. The peels were prepared using a mixture of 2/3 Cold Cure epoxy resin and 1/3 hardener which was poured directly on one half of the split core. The mixture penetrated the core in proportion to the sediment porosity and hardened within 24 hours. The epoxy permeated sediment, once solid, was loosened from the core liner and remaining sediment, then rinsed with water to remove all loose sediment. Photographs of the peels were then taken (Fig.7, Appendix 3).

The grain size frequency distribution of all samples, including subsamples from the split cores were analysed using a combination of techniques at the sediment laboratory of the Atlantic Geoscience Centre. The gravel fraction was separated from the fines using a standard 2mm sieve while the sand fraction was separated from the muds using a 53um wet sieve. Where the sand fraction exceeded 10% of the total sample weight it was analysed for its equivalent spherical sedimentation diameter, at 0.2 phi intervals, using a settling tube. Similarly, where the mud fraction exceeded 10% of the total sample weight it was analysed over the range of 63um to 0.5um using a Sedigraph 5000D. A more detailed description of the laboratory procedures used at the AGC sediment laboratory are documented by Asprey et. al. (in prep.) The results of the gravel, sand and mud analyses were overlapped using the computer program MERGE and the percentage size fractions, moment statistics (Appendix 2) and frequency distribution plots (Appendix 3) were generated with the computer program READY (Hackett et al., 1986). The grain size distributions in Appendix 2 are plotted as a histogram on a logarithmic frequency scale and a curve on a cumulative frequency scale.

TABLE 1. Survey information for beach sites monitored in 1985 along Bylot and Baffin Islands, NWT. The site locations are given in Figure 1, and cross sectional diagrams for 'Middle Bay' and three sites on Baffin Island are illustrated in Figure 2.

LATITUDE AND LONGITUDE	PLACE NAME	PROFILE NO.	DATE (DD/MO/YR)	TIME OF WL (EDT)	DISTANCE BM1 TO BM2 (m)	BM1 TYPE#	BM1 HT (cm)	BM2 TYPE#	BM2 HT (cm)	OTHER MARKERS	SEDIMENT SAMPLE NO.
BYLOT ISLAND, NWT											
73^39.5' 78^04'	C. LIVERPOOL	1	15/08/85	12:08	33.8	IRON	54	IRON	47	--	---
73^35.3' 77^44'	C. FANSHAWE	4	15/08/85	15:10	17.6	IRON	60	ROCK	-	--	—
73^33.5' 77^26'	C. FANSHAWE	1	15/08/85	16:30	35.8	IRON	46	CAIRN*	-	--	—
73^21' 76^59'	BATHURST BAY	2	11/08/85	17:30	23.9	CAIRN	-	IRON	57	--	—
73^9.5' 76^36'	'MIDDLE BAY'	2	11/08/85	14:21	21.9	IRON	43	-	-	PIN	3888-3912 3954-3957,3959
72^59' 76^20'	'SOUTH BAY'	2	13/08/85	11:49	-	IRON	71	-	-	--	—
BAFFIN ISLAND, NWT.											
72^16.5' 74^57'	CAPE COUTTS	1	18/08/85	15:56	32.6	IRON	47	IRON	52	--	3543-3552 3872-3877
71^30' 71^35'	CAPE ADAIR	1	07/08/85	17:24	62.6	WOOD	28	WOOD	-	--	3952,3960
70^01' 67^21'	CAPE ASTON	1	04/08/85	11:54	57.0	-	-	WOOD	25	WOOD	3846-3866 3553-3558 3934

TABLE 2 - 1985 SEDIMENT SAMPLE LOCATIONS FROM EASTERN BAFFIN AND BYLOT ISLANDS, NWT
Sample locations are indicated in Figures 1 to 6. Grain size analyses are attached as Appendix 2.
Photographs of epoxy resin peels of the cores are attached as Appendix 3 and Figure 7.

GEOGRAPHIC AREA	SED LAB #'s	DATE d/m/y	SITE LOCATION	FIG #	SAMPLE TYPE (depth)	SETTING
BAFFIN ISLAND						
CAMBRIDGE FIORD	3953	12/8/85	STOP 1	1	Grab	Organics from raised delta, Keel River (26m asl)
CAPE ADAIR	3952	7/8/85	PROFILE 1	2	Grab	Upper foreshore, beachcusp
""	3960	7/8/85	""	2	Grab	Foreshore, high tide level
""	3961	7/8/85	STOP 1	1	Grab	Raised beach (N of Profile 1)
CAPE ASTON	3846-51	4/8/85	PROFILE 1	2	Core 1-1 (55 cm)	Backshore, deflation zone
""	3852-56	4/8/85	""	2	Core 1-2 (50 cm)	Backshore, dune
""	3857-61	4/8/85	""	2	Core 1-3 (57 cm)	Backshore, dune
""	3862-66	4/8/85	""	2	Core 1-4 (55 cm)	Top beach berm
""	3553-58	4/8/85	""	2	Core 1-5 (54 cm)	Lower foreshore, ridge top
""	3934	4/8/85	""	2	Grab	Infill sediment, 1983 Pit 2
""	3940	4/8/85	STOP 1	4	Grab	Raised sequence - lower
""	3941	4/8/85	""	4	Grab	Raised delta 6m below surf. - bottom H.M.
""	3942	4/8/85	""	4	Grab	Raised beach 1-5
""	3962	7/8/85	STOP 3	4	Grab	Raised beach, pit 2, cemented veins
""	3936-39	4/8/85	STOP 4	4	Section 1 (34 cm)	Backshore, dune, pit 3
""	3867-71	7/8/85	STOP 4	4	Core (54 cm)	Backshore, dune, adjacent Section 1
CLYDE INLET	3922,23,27-29	2/8/85	STOP 1	5	Section 1 (25 cm)	Nivation hollow 3, pit C
""	3925	6/8/85	STOP 2	5	Grab	Beach sand
""	3926	6/8/85	""	5	Grab	Glaciomarine mud
""	3924	6/8/85	""	5	Grab	Flow till
""	3920	6/8/85	""	5	Grab	Aeolian sands over flow till
COUTTS INLET	3543-3546	18/8/85	PROFILE 1	2	Core 1-1 (19 cm)	Foreshore slope
""	3872-3877	18/8/85	""	2	Core 1-2 (45 cm)	Top beach face slope
""	3547-3552	18/8/85	""	2	Core 1-3 (25 cm)	Backshore slope
MCBETH FIORD	3566-70	11/9/83	-	6	Core 1 (64 cm)	Delta (from 1983 survey)
""	3878-87	6/8/85	STOP 1	6	Core 2 (60 cm)	Tombolo
""	3918	6/8/85	STOP 1	6	Grab	Upper lagoon segment
""	3919	6/8/85	STOP 1	6	Grab	Lagoon beds - organics
""	39-20,21,31,32	6/8/85	STOP 2	6	Section 1 (117 cm)	RB/Delta complex
""	3917	6/8/85	STOP 4	6	Grab	Lagoon beds - oldest part of section
""	3933	6/8/85	STOP 5	6	Grab	Tidal mud 0.5m above high tide
""	3935	6/8/85	STOP 6	6	Grab	Under moraine boulders -top of section
BYLOT ISLAND						
'MIDDLE BAY'	3888-3889	11/8/85	PROFILE 2	2	Core 2-1 (58 cm)	Barrier beach (BB), dune
""	3893-3898	11/8/85	""	2	Core 2-2 (58 cm)	BB, upper foreshore, berm
""	3899-3904	11/8/85	""	2	Core 2-3 (57 cm)	BB, backshore, flood zone
""	3905-3912	11/8/85	""	2	Core 2-4 (54 cm)	BB, backshore, river edge
""	3954	11/8/85	""	2	Grab	Beach top, H.M. 20 cm above base of pit 1
""	3957	11/8/85	PROFILE 2	3	Grab	Beach, typical H.M. layer (8 cm depth)
""	3955	11/8/85	STOP 12	3	Grab	Frozen beach sediment at tidal inlet
""	3956	11/8/85	STOP 5	3	Grab	Raised beach
""	3959	11/8/85	STOP 3	3	Grab	Channel sands 1.5 km from ice front
'SOUTH BAY'	3958	11/8/85	STOP 1	1	Grab	Terrace fronting glacier, 0-1m depth
BATHURST BAY	3963	11/8/85	STOP 10	1	Grab	At central ice front

SUMMARY

Beach Morphology The coastlines of eastern Bylot and Baffin Islands are characterised by a wide variety of shore types ranging from steep rock headlands and glacial ice with no beach to continuous, low wide sand or gravel beaches along the coastal forelands (Sempels, 1982, McLaren and Barrie, 1985).

Resurveys of selected beaches in 1985 (Table 1) indicated that most sites had experienced a net erosion particularly across the upper foreshore slope while the lower foreshore had experienced a sediment accumulation in the form of ridge and runnel features; and several of the barrier beaches had accreted across the backshore because of wave washover deposition (Fig.2).

Beach Sediment A distinctive characteristic of all beach samples collected in 1985 (Table 2), was their high degree of sorting by waves and wind. With the exception of the backbarrier samples which contained more mud, all of the outer coast beaches consisted of very well to well sorted, ie. 0.2-0.9 phi, fine to coarse sand (Appendix 2). At Capes Adair and Coutts the foreland beaches were composed of coarse sand with a mean size ranging from 0.46 to 1.66 phi (0.73- 0.32 mm, Appendix 2). At Cape Aston and 'Middle Bay' the present barriers consisted of a slightly finer sand with a mean size ranging from 1.34 to 2.07 phi (0.39- 0.24 mm).

As a contrast, the sediment sampled from the fiord head deltas, the raised delta terraces at Cape Aston, and the backshore nivation hollows near Clyde River was much more poorly sorted and contained greater proportions of mud (Appendix 2) . Similarly the samples collected from the glacial deposits in 'South Bay' and Bathurst Bay, Bylot Island (Fig. 1) consisted of a poorly sorted mixture of gravel, sand and mud.

DISCUSSION OF SELECTED SHORE TYPES

1. Sand (Barrier) Beaches

In 1985 attention was focused on the continuous sand beaches of the outer forelands, eg. Capes Coutts, Aston and Adair, and the sandur shores of Bylot Island (Fig. 1,2). The beaches, in particular the sand barriers, exhibited an assymmetrical shape with a steeper sloping seaward face of 2° to 2.7° (Table 3) and a more gradual landward sloping backshore of less than 1°. The sand barriers vary in width from 100-185m and have a crest height of 0.8 to 2.3m above mean water level. For the sites surveyed in 1985 the crest height decreased inversely with tidal range. At Cape Adair the sand beach is more representative of non-barrier shores. It has a steeper foreshore slope, a higher crest and is narrower than the lower sand barriers.

TABLE 3. Morphological characteristics, as measured in August 1985, of selected sand beaches along eastern Bylot and Baffin Islands, NWT. The site locations are provided in figures 1 and the cross sectional diagrams are illustrated in Figure 2.

LOCATION	PROFILE NO.	BEACH WIDTH* (m)	DIMENSIONS SLOPE(tan Q) Backshore	Foreshore	CREST# HEIGHT (m)	MEAN THAW DEPTHS (m) BACKSHORE	FORESHORE
'Middle Bay'	2	125	0.012	0.036	0.8	0.89	0.97
Cape Coutts	1	102	0.014	0.048	1.6	0.71	0.57
Cape Aston	1	185	0.006	0.041	2.3	0.76	0.53
Cape Adair	1	64	0.017	0.138	2.9	-	0.83

* Distance from the intersection of mean water level with the backbarrier lagoon and the beach foreshore.

# Height above mean water level.

A preliminary analysis of the across shore morphology and sediment character of the central sand barrier at 'Middle Bay', Bylot Island (Fig. 2, 3) is presented as an example of this coastal type. For this discussion the barrier has been subdivided into lower and upper backshore, foreshore, and nearshore zones because of the different processes which dominate each one.

(a) Lower Backshore - The landward extent of the sand barriers is either marked by a steep stream cut bank where drainage channels flow parallel to shore, as at 'Middle Bay' barrier, or by a low lying surface that is alternately exposed and flooded during spring melt and higher tides as at Cape Aston. At 'Middle Bay' the lower backbarrier is marked by a flat terrace which has formed through backbarrier flooding. Sediment samples collected from this zone , ie. core 2-4 (Fig. 2,7, Table 2) are mud and organic rich and are more poorly sorted than the more seaward portions of the barrier. Core 2-4 and the base of core 2-3 (Fig. 2,7) consisted of alternate muddy and sandy units that exhibited a more irregular structure than the parallel bedding of the berm and washover deposits which covered the upper backshore, ie. upper part of core 2-3 and all of core 2-1 (Fig. 2,7). The abundance of heavy minerals was also much less beneath the lower than the upper backshore. In 1983 and 1985 the water table was encountered 40-50 cm below the beach surface and the mean depth of thaw was 89 cm.

(b)Upper Backshore - The upper portion of the back barrier is dominated by aeolian processes and wave washover during higher energy storm events. The dune crests are oriented oblique or transverse to the coast, they are low (<0.5m), and are best developed in late summer when the barrier sands are drier. Core 2-1 (Fig. 2,7) collected from the upper 0.6m of sediment near the beach crest consisted of well defined, parallel interlaminations of light and heavy sands. Preserved dune structures are less than a few centimetres thick and discontinuities in the bedding are marked by thick (up to 4cm) concentrations of heavy minerals. The burial of sea ice in the sand can produce irregularities in the sediment structure, e.g. base of core 2-2 (Fig. 7), but their preservation potential is low because of the dominance of waves.

(c) Foreshore - Seasonal beach changes are primarily recorded across the foreshore zone where the morphology can vary from steep wave cut banks to a more gradual slope with ridge and runnel features. Core 2-2 (Fig. 2,7) was collected from a recently formed berm on the upper foreshore. The upper portion of the core consisted of very thin, parallel interlaminations of heavy and light sands while the lower part consisted of slightly coarser, seaward dipping, swash deposits with the heavy minerals well mixed with the lighter sands (Fig. 7).

(d) Nearshore - Little or no bathymetric and sediment information is available from 'Middle Bay' however there is no evidence of a nearshore bar similar to that observed off the sand barrier at Cape Aston. There, the bars appear to be composed of sand and gravel and are intermittently cut by sea ice scour or ice wallow pits.

Cores collected from the other sand beaches indicate a similar but less pronounced change in across shore sedimentation to that found at 'Middle Bay' barrier. A more detailed study of the cores is required to confirm these trends.

2. Shoreline Nivation Features

Perennial snowbanks, snow patches and associated nivation hollows are common features within the lee or shadow of moderate to steep sloping shores of many Arctic Islands. Snowbanks can extend hundred's of metres alongshore and ten's of metres in width. Where the snowbanks reach present sea level, they incorporate the seasonal icefoot and are marked by a near vertical seaward ice face, but where the snowbanks have receded landward they are outlined by a much thinner edge, largely due to seasonal ablation. Nivation processes do not dominate general coastal development as do waves and sea ice but they can be a locally important periglacial modifier of beach and backshore sedimentation.

The late arrival of our helicopter at the beginning of the 1985 season presented an opportunity to investigate a series of nivation hollows and associated shoreline features and deposits. These were located just to the west of the Clyde River delta and the village of Clyde River along the north shore of Patricia Bay (Fig. 1, 5).

Morphology -The north shore of Patricia Bay is part of the Clyde Foreland which consists of unconsolidated or partially consolidated deposits varying in grain size from very coarse boulder gravel to clay (Feyling-Hanssen 1976). The shore moderately slopes to 25-30m elevation and is marked by several flights of nivation features. Only the nivation hollows (NH) closest to present sea level were examined in 1985.

A comparison of the area of snowbanks between 1960 (NAPL air photo A16213-34) and 1985 (field observations) suggested that all of the snowbanks had ablated by at least 50% and many of the smaller snowpatches ie. NH-5, had melted completely over the 25 year period. The snowbanks at NH-1 and NH-3, where most of observations were made, each had ablated into two parts (Fig. 5a, Table 4).

Table 4. Snowbank dimensions along Patricia Bay, Baffin Island, NWT. August 2, 1985. The locations of the snowbanks are provided in Figure 5.

Snowbank	Length (m)	Width (m)	Icefoot Width (m)
NH-1	500	25-50	5
NH-2	430	40-60	5-10
NH-3	400	15-30	N/A
NH-5	no data collected		

In cross-section (Fig. 5a, inset) the nivation hollows are characterised by a relatively steep back wall topped by a distinctive boulder lag deposit. This lag has developed primarily as a result of colluvial processes and surface run-off washing the fines downslope, although it may have originally formed by wave erosion prior to snowbank accumulation. At NH-2 the back boulder rim extended 2-4m above the 1985 surface of snow and ice, which in turn varied from a maximum thickness of 2m to only a few centimetres at the edges of the snowbank. Ice thickness was also a minimum adjacent to large boulders (heat sinks) that were exposed within the snowbank. The ground was frozen beneath the edge of the snowbank but became progressively more thawed with distance from the ice edge.

Sedimentology - Where snow and ice extended to present sea level little or no beach had formed (Fig. 5a). The ground was only partly thawed (< 0.1m), and beach development was further restricted by water turbulence from waves reflecting off the steep face of the icefoot. The net result was a poorly defined beach covered only by a cobble-boulder lag interspersed with a thin veneer of rill-washed colluvium and beach sediment. Heavy minerals were only concentrated above the frozen substrate beneath the ice edge.

In contrast, where snow and ice had retreated landward rill and stream cut colluvial and beach deposits had accumulated (Fig. 5a). At NH-3, where the ice had receded the farthest, it was fringed by a low wave-cut hummocky terrace (Fig. 5a,b). This was outined at the base by a cobble-boulder lag (interpreted as a former snowbank terminus) that was fronted and partly covered by well sorted modern beach deposits and rill-washed mixed sand and gravels. Alongshore was a tidal flat, scattered with numerous large boulders up to 3m in diameter .

In a section dug at the seaward edge of the low hummocky terrace (Fig.5b, arrow) a wind reworked pebble lag overlay a 15-20 cm thick bed of homogeneous sand. Thin mud and organic layers occurred within and at the base of this sand unit. Heavy minerals appeared as concentrated laminations near the base of the thick sand unit, and were also observed as truncated structures within the pebbly rill-washed beach sand that extended to the base of the section at 40 cm depth.

Samples 3922-23 and 3927-29 were collected from a second section dug closer to the margin of snowbank NH-3 (Table 2, Fig. 5). The vertical sequence observed included a 2 to 5 cm thick surface unit of dessicated mud and organic material, overlying 4 to 8 cm of poorly sorted sand containing distinctive thin mud and organic layers similar to those observed in the section dug at the edge of the terrace. Below this, a 2 cm thick light coloured, well sorted sand occurred, which pinched out in a landward direction; it overlay a very well sorted concentration of heavy minerals at a depth of 12 cm. Beneath the heavy mineral layer was a uniform coarse sand 5-20 cm thick that overlay an organic rich layer at the base of the section.

A preliminary sedimentological interpretation is proposed for these sections, which is also based on additional samples (3924-26 and 3930, Table 2) collected from specific geomorphic features in the area of NH-3 (Fig. 5a). The surface muds are seasonal ice-melt deposits. These overlie colluvial fan and wave reworked sand in which heavy minerals have been concentrated, similar to the sediments observed beneath the seaward edge of the icefoot at NH-1 and NH-2. The coarse sands at 15-20 cm depth resemble beach foreshore deposits and the increased mud at the base of the section is thought to be wave reworked colluvium.

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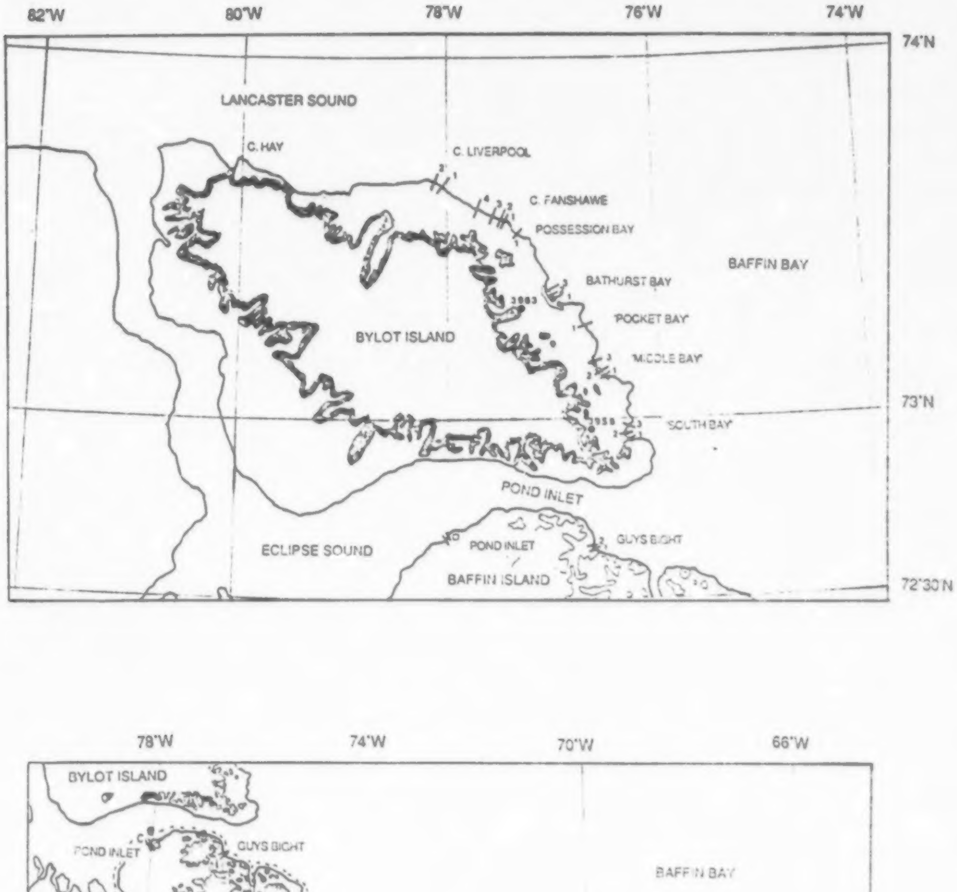

82°W
80°W
78°W
76°W
74°W
74°N
73°N
72°30'N
LANCASTER SOUND
C. HAY
C. LIVERPOOL
C. FANSHAWE
POSSESSION BAY
BATHURST BAY
BAFFIN BAY
'POCKET BAY'
'MIDDLE BAY'
BYLOT ISLAND
'SOUTH BAY'
POND INLET
ECLIPSE SOUND
POND INLET
GUYS BIGHT
BAFFIN ISLAND
78°W
74°W
70°W
66°W
BYLOT ISLAND
POND INLET
GUYS BIGHT
BAFFIN BAY
C. COUTTS
72°N
C. ADAIR
CAMBRIDGE FIORD
SCOTT INLET
BAFFIN ISLAND
C. EGLINTON
CLYDE RIVER
C. HEWETT
CLYDE INLET
70°N
C. ASTON
McBETH FIORD
69°30'N

FIGURE 1. Location map with place names, beach profile stations, isolated sediment sample sites and aerial oblique video coverage (dashed line) from the 1985 land based surveys of (A) Bylot Island, and (B) Baffin Island, NWT. Also shown for reference is the extent of glacial ice (shaded areas). The location of the other sediment samples are provided in Figures 2-6.

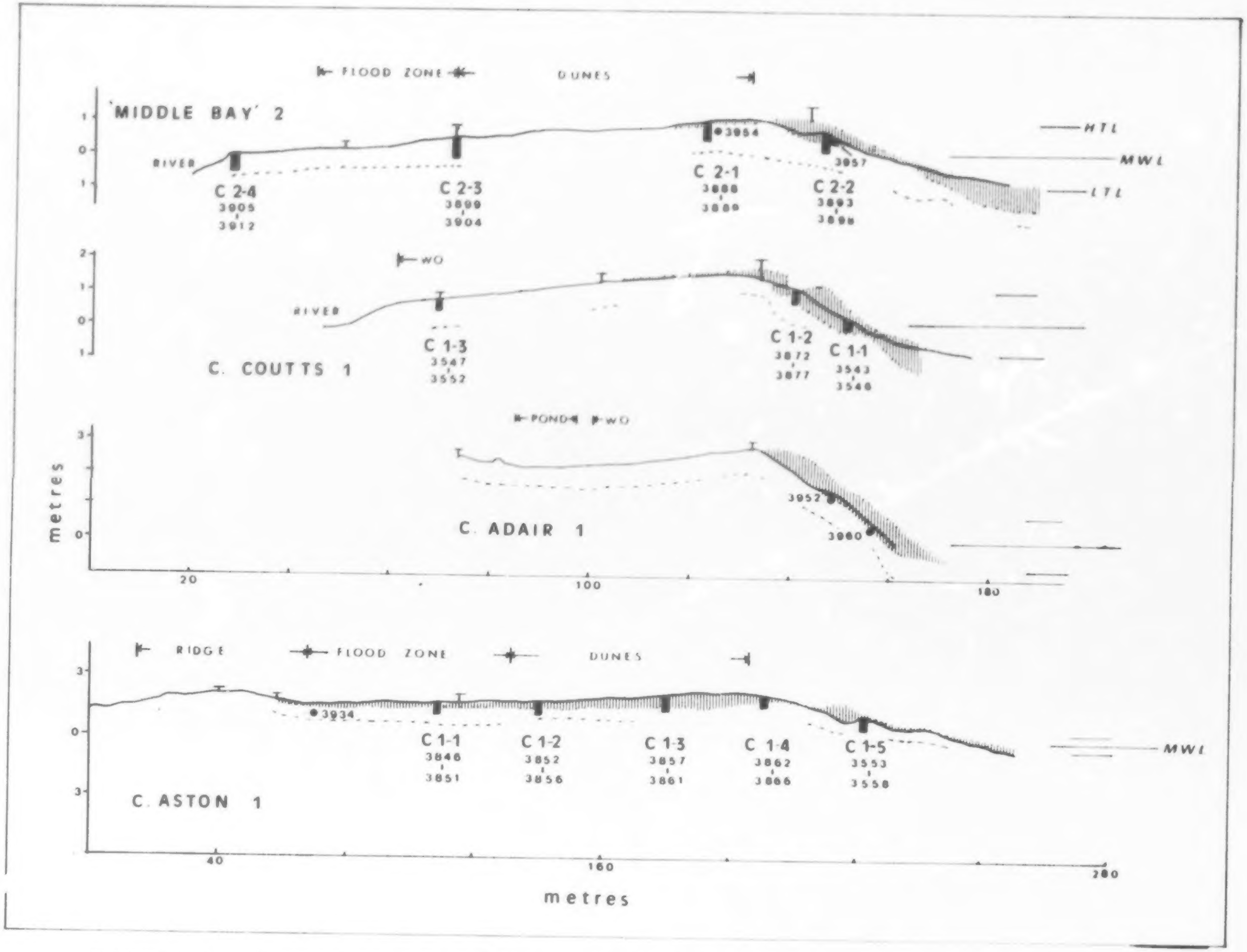


FIGURE 2. Examples of sand barrier beaches surveyed along the eastern coast of Bylot and Baffin Islands showing the location of grab and core samples collected in 1985. The stippled zone on each profile delimits the sweep zone or maximum zone of sediment mobility surveyed during the period 1979-1985. The dashed subsurface line marks the maximum thaw depth recorded at these beaches. Note the change in scale between the upper three profiles and the Cape Aston profile.

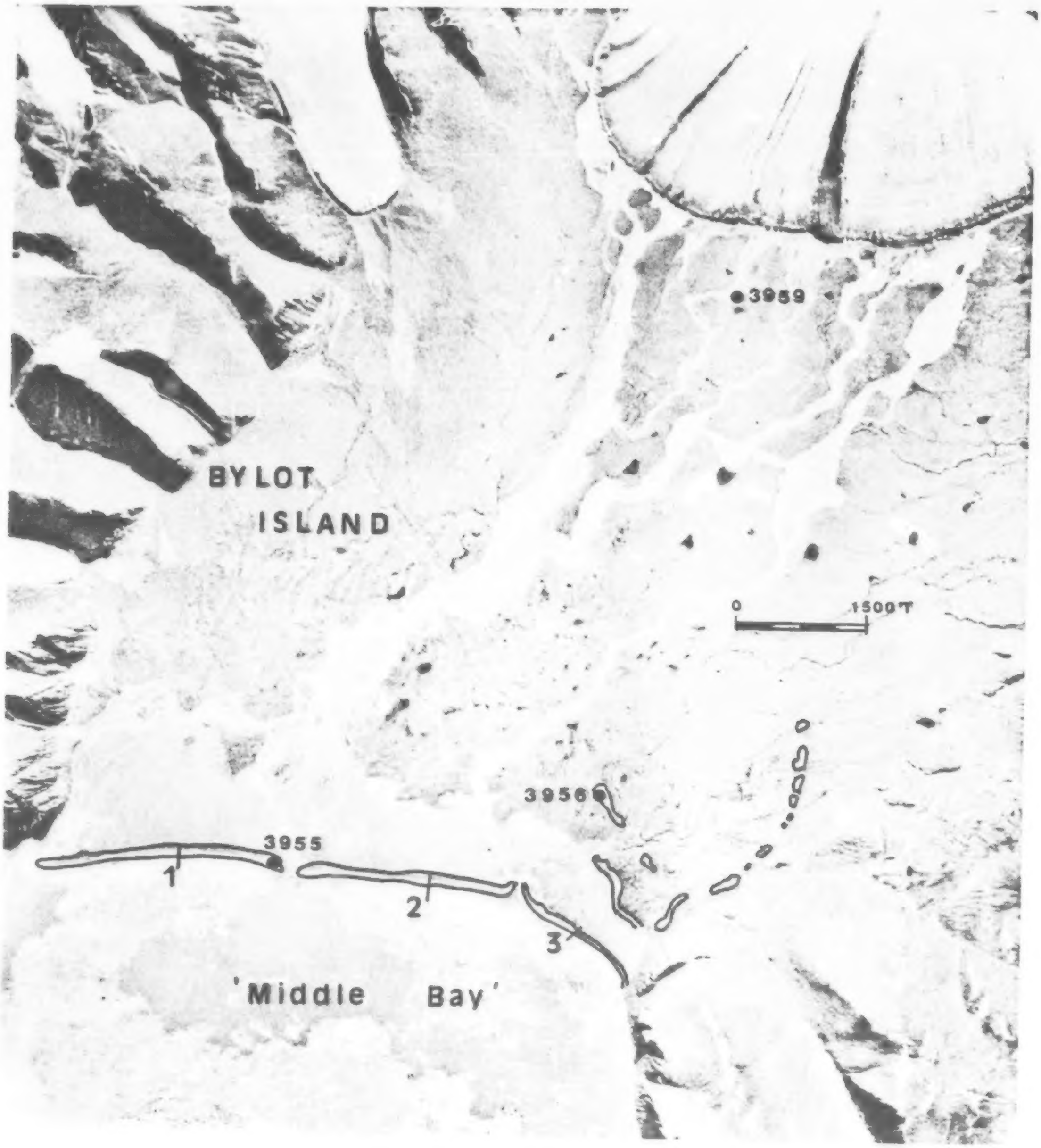


FIGURE 3. Aerial view (A16214-78, NAPL) of the glacier, outwash plain and barrier beach at 'Middle Bay' Bylot Island. Two sediment samples were collected from inland features and one from frozen sediment exposed along the banks of the central tidal inlet, however most of the samples and cores were collected from across the present barrier beach at profile 2. See Figure 2 for the cross-sectioal view of the barrier and detailed location of the samples.

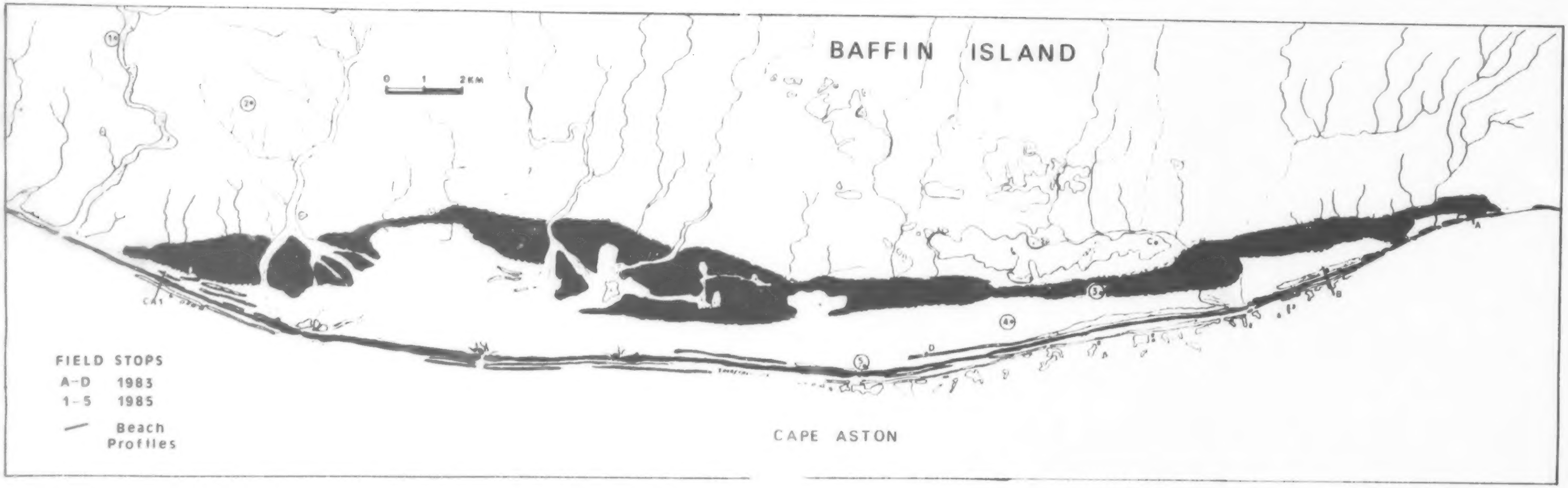

BAFFIN ISLAND
0 1 2KM
FIELD STOPS
A–D 1983
1–5 1985
Beach Profiles
CAPE ASTON
CA1
A
B
C
D
1
2
3
4
5

FIGURE 4. Map of the Cape Aston barrier beach system showing the sampling sites from 1983 and 1985. The present barrier (shaded in) is fringed by a discontinuous series of narrow nearshore bars and by narrow, low raised beach ridges that resemble the bars. Farther inland the shaded band is a zone of complex beach ridges and fluvial channel features developed within 10m of the present sea level. Between the raised and present beach is a wide flood zone which dries and becomes reworked by aeolian processes late in the summer e.g. September.

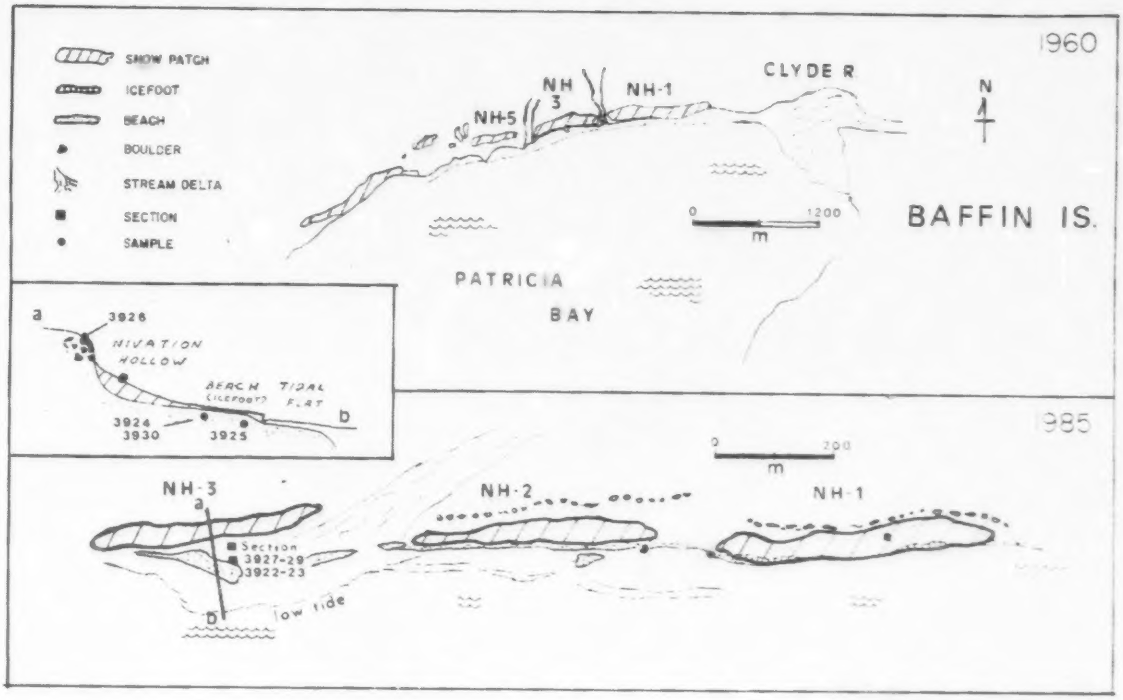

1960
SNOW PATCH
ICEFOOT
BEACH
BOULDER
STREAM DELTA
SECTION
SAMPLE
NH 3
NH-1
NH-5
CLYDE R
N
0
1200
m
BAFFIN IS.
PATRICIA
BAY
a
3926
NIVATION HOLLOW
BEACH (ICEFOOT?)
TIDAL FLAT
b
3924
3930
3925
1985
0
200
m
NH-3
a
Section
3927-29
3922-23
b
low tide
NH-2
NH-1

FIGURE 5a. Sketch of the nivation hollows along Patricia Bay near Clyde River, Baffin Island in 1960 (from NAPL air photo A16213-34), and in 1985. The sediment sample sites from 1985 are shown as well as a generalized cross-sectional view of this type of coast.

5b. Ground view of the hummocky terrace exposed seaward of NH-3 in August 1985. Arrows indicate the location of the detailed sections and sediment samples completed in 1985.

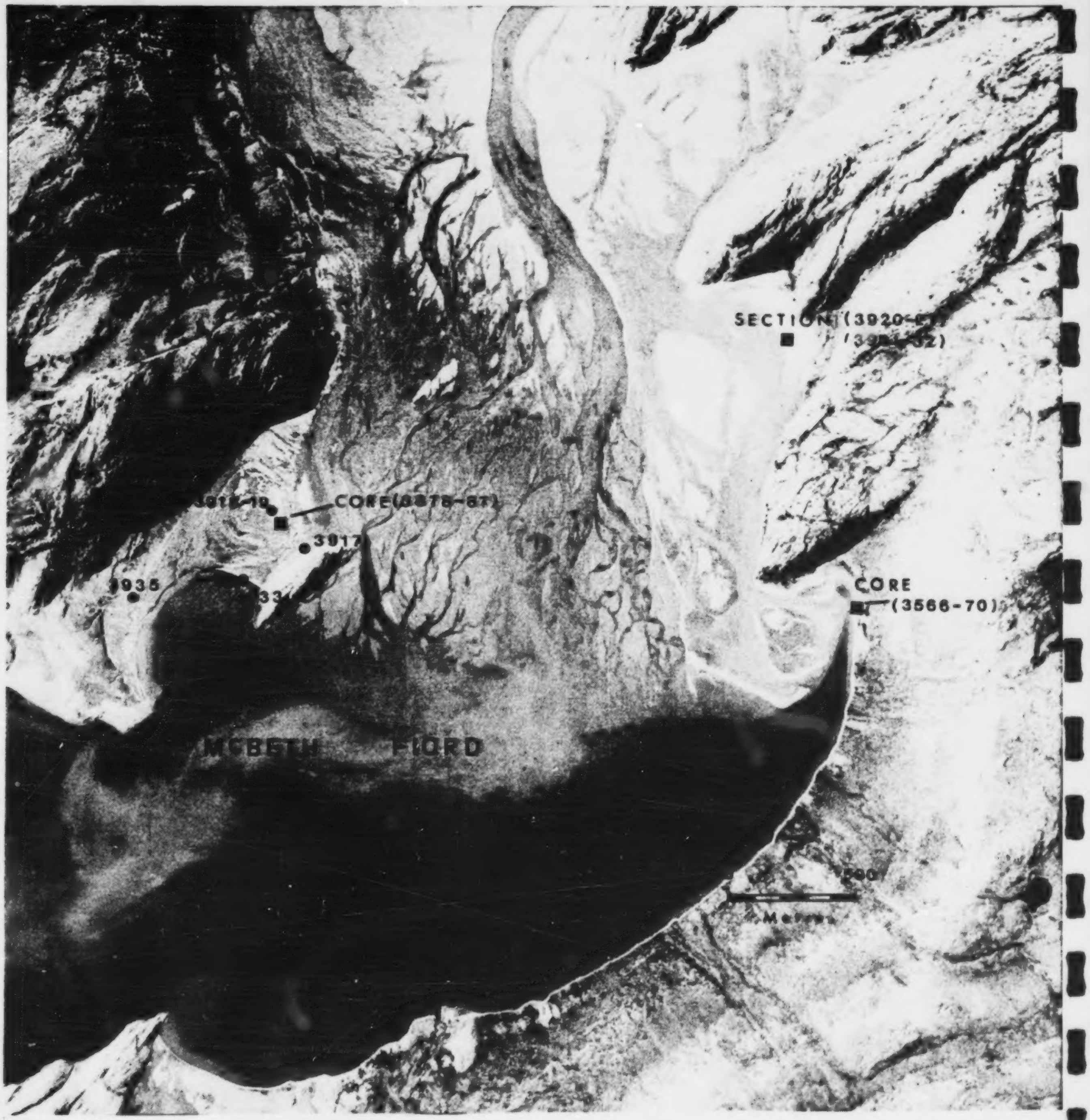

SECTION
CORE
3917
CORE
(3566-70)
MCBETH FIORD
500
Metres

FIGURE 6. Aerial view (A17015-112, NAPL) of the delta at the head of McBeth Fiord showing the 1985 sediment sample sites. The core shown at the right hand corner of the delta was collected in 1983 but the results of the sediment analyses (Appendix 2) were not available until after the previous data report was published (Syvitski et al. 1984).

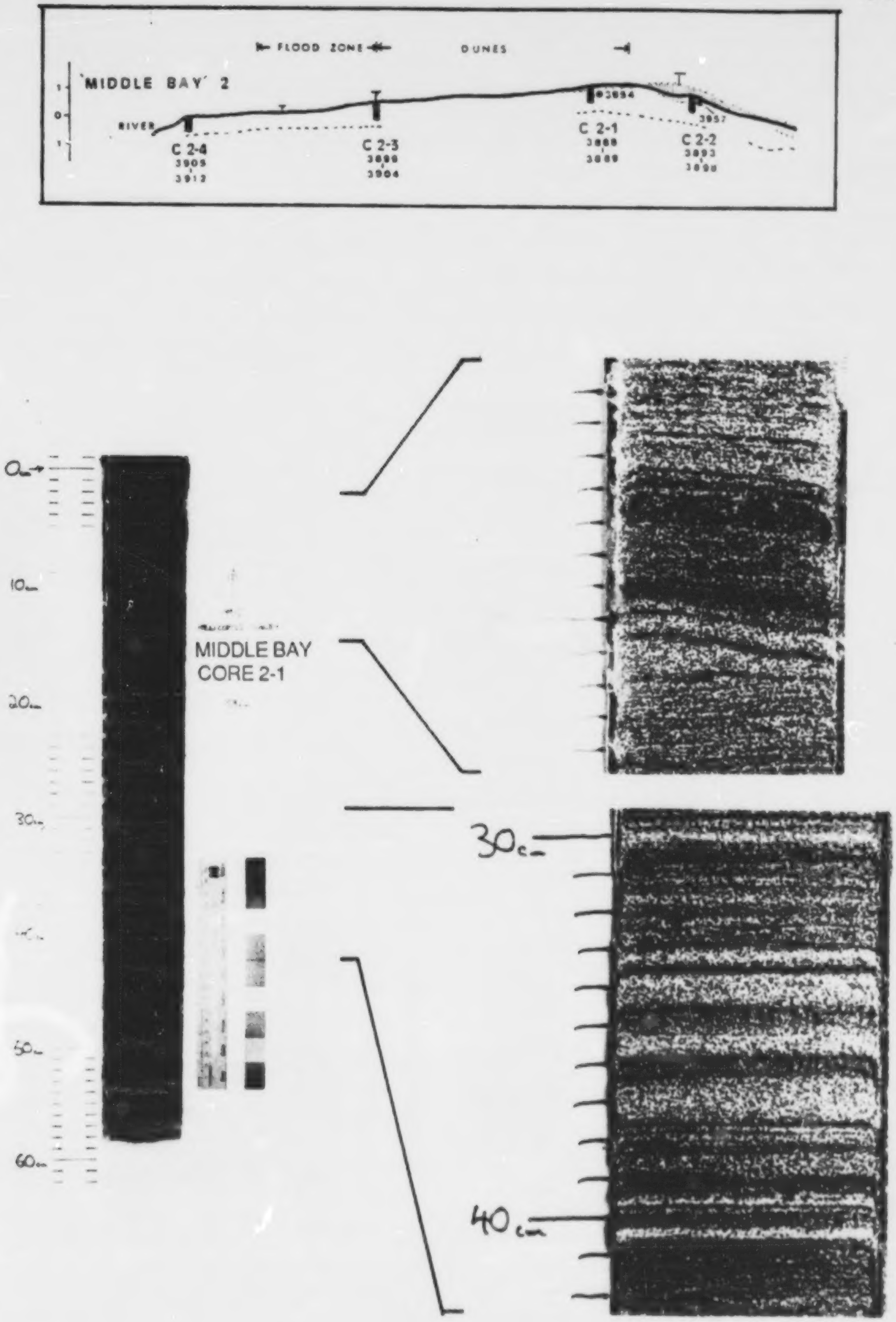

FLOOD ZONE
DUNES
'MIDDLE BAY' 2
1
0
1
RIVER
C 2-4
3905
3912
C 2-3
3899
3904
C 2-1
3888
3889
3894
C 2-2
3893
3898
3957
0cm
10cm
20cm
30cm
40cm
50cm
60cm
MIDDLE BAY
CORE 2-1
30cm
40cm

Figure 7. Photographs of the epoxy resin peel cores collected across the central sand barrier at 'Middle Bay', Bylot Island. The locations where the cores were collected are shown in Figure 2.

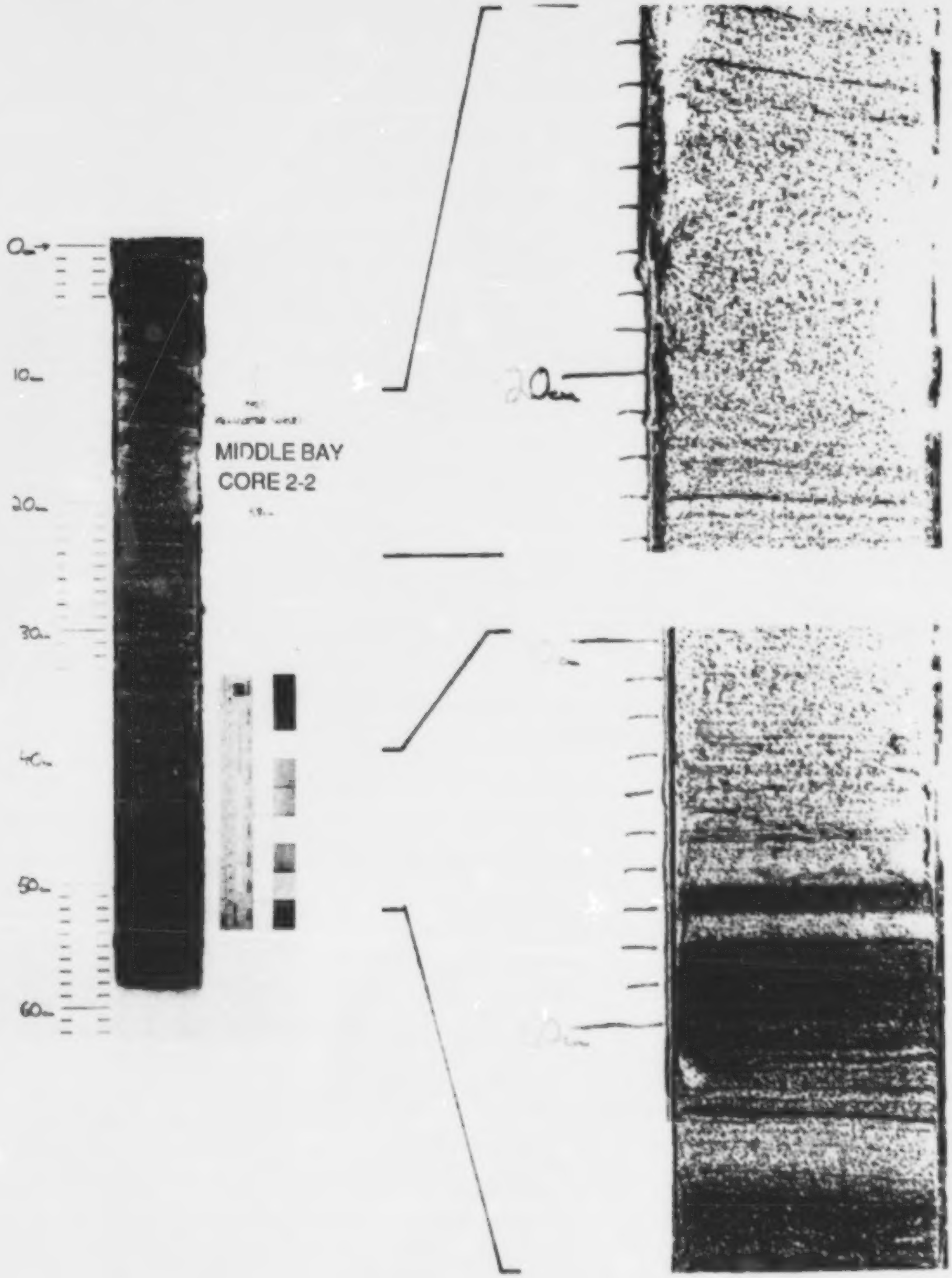

0cm
10cm
20cm
30cm
40cm
50cm
60cm
MIDDLE BAY
CORE 2-2
20cm

Figure 7 (continued)

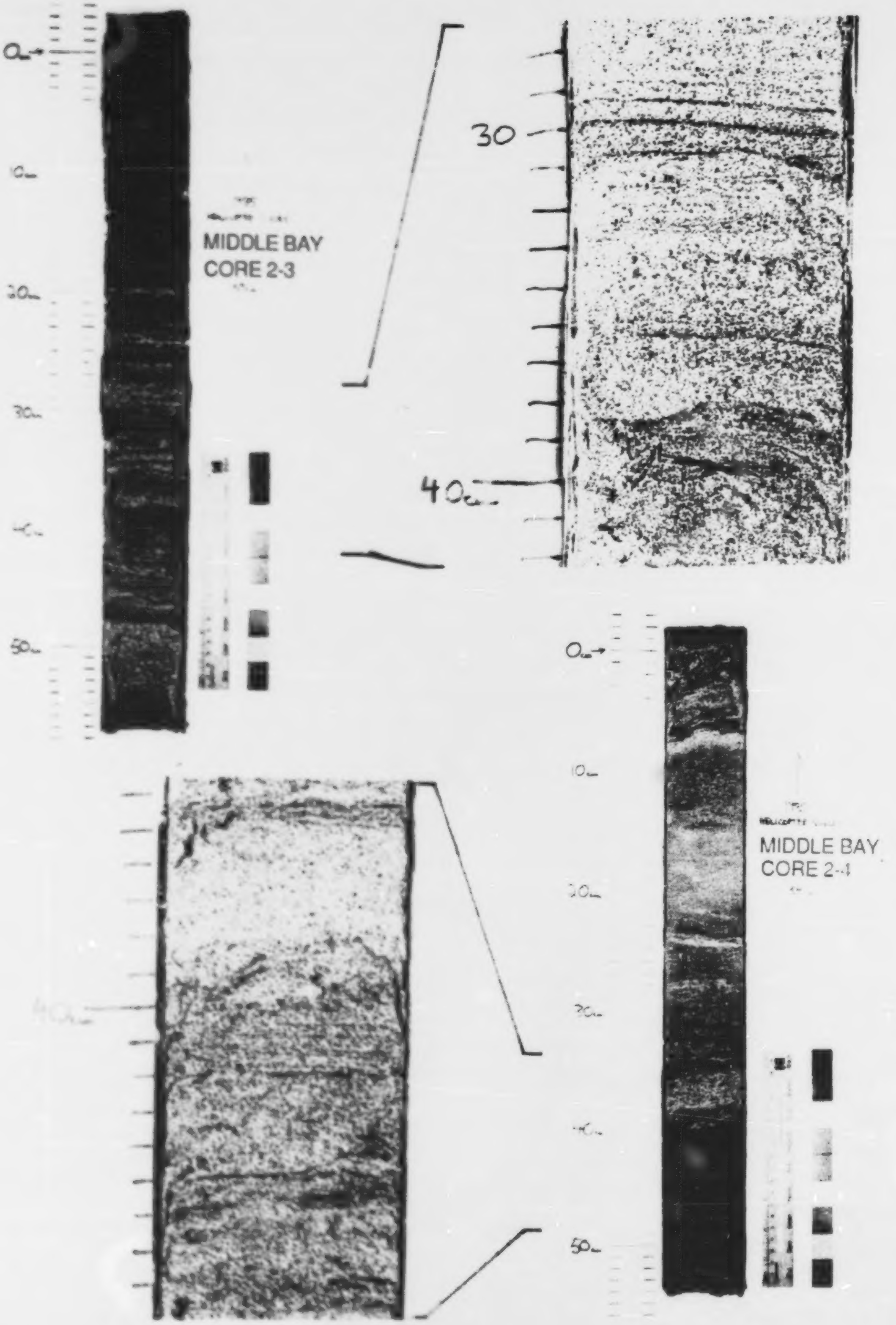

0cm
10cm
20cm
30cm
40cm
50cm
MIDDLE BAY
CORE 2-3
30
40cm
40cm
0cm
10cm
20cm
30cm
40cm
50cm
MIDDLE BAY
CORE 2-4

Figure 7 (continued)

APPENDIX 1

BEACH SURVEY AND SEDIMENT SAMPLE INFORMATION FOR SITES MONITORED BETWEEN 1979 AND 1985 ALONG BYLOT AND BAFFIN ISLANDS, N.W.T.

LATITUDE AND LONGITUDE	PLACE NAME	PROFILE NO.	DATE (DD/MO/YR)	TIME OF WL (EDT)	DISTANCE BM1 TO BM2 (m)	BM1 TYPE#	BM1 HT (cm)	BM2 TYPE#	BM2 HT (cm)	OTHER MARKERS	SEDIMENT SAMPLE NO.
BYLOT ISLAND, NWT											
73^40.3' 78^14'	C. LIVERPOOL	2	16/08/79	15:20	20.8	CAIRN	-	CAIRN	-	--	79338-79341
	""""""""	2	22/08/79	12:00	"	"		"	-	--	----
	""""""""	2	29/07/81	15:15	17.0	IRON*	53	IRON*	--	--	1217,1218 1259
73^39.5' 78^04'	C. LIVERPOOL	1	14/08/79	16:10	34.6	CAIRN	-	CAIRN	-	--	79328-79329 79337
	""""""""	1	22/08/79	10:42	"	"		"		--	----
	""""""""	1	03/09/79	10:30	"	"		"		--	----
	""""""""	1	12/08/81	17:24	37.5	IRON*		IRON		--	1216
	""""""""	1	15/08/85	12:08	33.8	IRON	54	IRON	47	--	----
73^35.3' 77^44'	C. FANSHAWE	4	13/08/79	14:50	-	-	-	ROCK	-	--	79321-79323
	""""""""	4	22/08/79	13:00	-	-	-	"	-	--	79347-79348
	""""""""	4	12/08/81	17:45	21.0	IRON*	58	ROCK	-	--	1208,1209
	""""""""	4	15/08/85	15:10	17.6	IRON	60	ROCK	-	--	----
73^34.3' 77^35'	C. FANSHAWE	3	13/08/79	11:20	24.0	CAIRN	-	CAIRN	-	--	79318-79320
	""""""""	3	26/08/79	10:00	-	"	-	"	-	--	79349-79350
	""""""""	3	12/08/81	18:07	25.0	IRON*	55	IRON*	45	--	1207
73^33.5' 77^28'	C. FANSHAWE	2	17/08/79	22:30	20.1	CAIRN	-	MAST		--	----
	""""""""	2	20/08/79	10:00	19.8	"	-	"	-	--	79343-79346
	""""""""	2	25/08/79	20:30	20.9	"	-	"	-	--	----
	""""""""	2	03/09/79	11:50	20.1	"	-	"	-	--	----
	""""""""	2	12/08/81	18:25	-	IRON*	71	-	-	--	1210,1211
73^33.5' 77^26'	C. FANSHAWE	1	15/08/79	20:00	36.1	CAIRN	-	CAIRN	-	--	79310-79312

APPENDIX 1 CONTINUED...

73^33.5'	77^26'	C. FANSHAWE	1	20/08/79	12:25	-	"	-	"	-	--	----
		""""	1	03/09/79	13:00	-	"	-	"	-	--	----
		""""	1	29/07/81	17:30	38.0	IRON*	46	WOOD*	41	--	1205,1206
		""""	1	13/08/81	18:20	-	"		WOOD	42	--	----
		""""	1	15/08/85	16:30	35.8	"	46	CAIRN*	-	--	----
73^31.3'	77^16'	POSSESSION BAY	1	23/08/79	16:00	24.5	CAIRN	-	CAIRN	-	--	79351-79355
73^22.3'	77^03'	BATHURST BAY	3	31/07/81	12:30	59.0	IRON	49	CAIRN	-	--	1238,1240
73^21'	76^59'	BATHURST BAY	2	12/08/79	10:45	23.4	CAIRN	-	CAIRN	-	--	79313-79316
		""""	2	23/08/79	11:25	-	"	-	"	-	--	----
		""""	2	03/09/79	14:10	-	"	-	"	-	--	----
		""""	2	31/07/81	11:00	26.6	CAIRN	-	IRON*	56	--	1237
		""""	2	14/08/81	19:35	-	"	-	"	55	--	----
		""""	2	11/08/85	17:30	23.9	CAIRN	-	IRON	57	--	----
73^20.3'	76^58'	BATHURST BAY	1	15/08/79	16:00	31.6	CAIRN	-	CAIRN	-	--	79330-79333
		""""	1	14/08/81	19:02	-	IRON	58	CAIRN	-	--	1219
73^16'	76^42'	'POCKET BAY'	1	08/08/79	12:20	-	CAIRN	-	-	-	--	79308-79309
		""""	1	23/08/79	10:30	-	"	-	-	-	--	----
		""""	1	12/08/81	18:50	5.0++	IRON	52	-	-	PIN	----
73^10.5'	76^37'	'MIDDLE BAY'	3	14/08/81	17:25	19.0	CAIRN	-	CAIRN	-	--	1201
73^9.5'	76^36'	'MIDDLE BAY'	2	31/07/81	15:55	71.0	IRON	46	WOOD	48	PIN	1195-1197
		""""	2	17/09/83	14:38	22.6++	IRON	39	-	-	PIN	1370-1375
		""""	2	11/08/85	14:21	21.9++	""	43	-	-	PIN	3888-3912 3954-3957,3959
73^8.5'	76^34'	'MIDDLE BAY'	1	14/08/81	16:13	36.1	IRON	52	WOOD	40	PIN	1198-1200
72^59.5'	76^20'	'SOUTH BAY'	3	14/08/81	13:18	-	CAIRN	-	-	-	--	----
		""""	3	17/09/83	10:12	10.9	""	-	CAIRN*	-	--	----
72^59'	76^20'	'SOUTH BAY'	2	14/08/81	12:40	-	IRON	68	-	-	--	1202-1204

APPENDIX 1 CONTINUED...

		""""	2	17/09/83	11:05	-	""	71	-	-	--	1369
		"""	2	13/08/85	11:49	-	""	71	-	-	--	----
72^57.5'	76^18'	'SOUTH BAY'	1	14/08/81	11:31	23.4	CAIRN	-	CAIRN	-	--	1365-1368
		""""	1	17/09/83	12:09	23.8	CAIRN	-	CAIRN	-	--	----

BAFFIN ISLAND, NWT.

72^40.5'	78^01.5'	POND INLET	C	05/08/79	14:00	14.2	PIN	-	CAIRN	-	WOOD	79305-79307
		""""	C	30/08/79	17:05	14.2	"	-	""	-	""	----
		""""	C	02/08/81	10:33	16.5	"	-	""	-	""	----
72^41'	78^01'	POND INLET	E	03/08/79	17:55	-	ROCK	-	-	-	--	79303-79304
		""""	E	30/08/79	16:00	-	""	-	-	-	--	----
		""""	E	02/08/81	11:36	-	""	-	-	-	--	----
72^38.8'	76^40'	GUYS BIGHT	2	15/08/81	10:59	17.6	IRON	43	WOOD	-	--	1241-1243
		""""	2	15/09/83	10:47	17.5	""	43	""	-	--	1360-1362
72^38.5'	76^39.5'	GUYS BIGHT	1	02/09/79	15:40	58.3	MAST	-	CAIRN	-	--	79377-79379
		""""	1	10/08/81	17:35	58.2	IRON	-	MAST	111	--	1244-1246
		""""	1	15/09/83	10:06	-	""	67	"" *	-	--	----
72^16.5'	74^57'	CAPE COUTTS	1	02/09/79	18:10	31.7	MAST	-	WOOD	-	--	79384
		""""	1	15/08/81	17:21	32.7	IRON*	50	IRON*	52	WOOD	1212
		""""	1	20/09/83	10:57	33.8	""	44	""	52	WOOD	1404
		""""	1	18/08/85	15:56	32.6	""	47	""	52	--	3543-3552 3872-3877
71^30'	71^35'	CAPE ADAIR	1	05/09/79	12:40	61.9	WOOD	-	WOOD	-	--	79387-79389
		""""	1	14/09/83	17:05	60.1	""	-	""	-	--	1376
		""""	1	07/08/85	17:24	62.6	""	28	""	-	--	3952,3960
71^14.8'	71^10'	SCOTT INLET	1	14/09/83	15:35	31.6	T-BAR	160	T-BAR	152	--	1364
70^01'	67^21'	CAPE ASTON	1	12/09/83	11:03	17.4	IRON	110	WOOD	25	--	1379-1384
		""""	1	04/08/85	11:54	57.0	-	-	WOOD	25	WOOD	3846-3866 3553-3558 3934

APPENDIX 2

GRAIN SIZE DATA , 1985 SEDIMENT SAMPLES (SEE TABLE 2):

Tabulated size fraction percentages and moment statistics

Frequency distribution plots

SAMPLE	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	SD Ø	SK	KURT
BAFFIN ISLAND										
CAMBRIDGE FIORD										
Grab	3953	0.16	88.84	11.00	---	---	3.00	1.48	1.92	8.47
CAPE ADAIR										
Grab	3952	0.00	100.00	0.00	---	---	0.73	0.38	2.34	14.00
Grab	3960	0.00	100.00	0.00	---	---	1.50	0.38	-0.12	5.82
Grab	3961	0.93	98.87	0.20	---	---	0.46	0.58	-0.70	19.05
CAPE ASTON										
Core 1-1										
1-3 cm	3846	0.00	99.88	0.12	---	---	1.84	0.36	1.67	12.78
10-12 cm	3847	0.00	99.95	0.05	---	---	1.88	0.32	1.25	11.96
20-22 cm	3848	0.30	99.61	0.09	---	---	1.83	0.42	-4.10	54.04
31-32 cm	3849	2.40	97.29	0.31	---	---	1.81	0.88	-3.60	21.73
34-36 cm	3850	0.24	99.58	0.18	---	---	1.64	0.58	-0.98	14.17
45-48 cm	3851	0.00	99.85	0.15	---	---	1.31	0.36	2.76	24.47
Core 1-2										
9-12 cm	3852	0.00	99.99	0.01	---	---	1.71	0.27	1.14	11.49
21.5-24 cm	3853	0.00	99.87	0.13	---	---	1.96	0.29	1.65	12.96
33.5-37 cm	3854	0.00	99.67	0.33	---	---	1.88	0.55	0.99	6.17
37-38 cm	3855	0.00	99.87	0.13	---	---	1.37	0.46	0.81	8.16
40-42.5 cm	3856	0.00	99.87	0.13	---	---	1.75	0.32	0.80	10.95
Core 1-3										
3-5 cm	3857	0.00	99.96	0.04	---	---	1.82	0.27	1.69	15.26
22-24 cm	3858	0.00	99.97	0.03	---	---	1.84	0.23	1.51	15.29
26.5-28 cm	3859	0.00	99.99	0.02	---	---	1.75	0.28	0.71	9.75
39-41 cm	3860	0.00	99.94	0.06	---	---	1.56	0.33	1.18	9.90
53.5-55.5 cm	3861	0.00	99.91	0.09	---	---	1.94	0.33	0.50	9.16
Core 1-4										
5-7.5 cm	3862	0.00	99.94	0.06	---	---	1.88	0.25	2.20	16.73
10-12 cm	3863	0.00	100.00	0.00	---	---	1.92	0.23	1.00	7.79
23-24 cm	3864	0.00	100.00	0.00	---	---	1.84	0.27	0.68	6.56
40-43 cm	3865	0.00	100.00	0.00	---	---	1.75	0.27	-0.07	7.05
52.5-54.5 cm	3866	0.00	100.00	0.00	---	---	1.77	0.27	0.17	7.25
Core 1-5										
0-4 cm	3553	0.00	100.00	0.00	---	---	1.78	0.29	-0.08	5.25
7-8 cm	3554	0.00	100.00	0.00	---	---	1.72	0.24	1.72	13.73
14-17 cm	3555	0.00	100.00	0.00	---	---	1.86	0.30	1.15	10.59
25-29 cm	3556	0.00	100.00	0.00	---	---	1.75	0.24	0.47	7.27
45-47 cm	3557	0.00	99.98	0.02	---	---	1.69	0.32	0.40	7.58
52-54 cm	3558	0.00	100.00	0.00	---	---	1.81	0.26	0.33	9.89
Grab	3934	0.00	100.00	0.00	---	---	1.37	0.42	0.22	4.89
Grab	3940	0.00	77.49	22.51	20.66	1.85	3.58	1.24	3.31	18.75
Grab	3941	2.55	96.96	0.49	---	---	1.50	1.01	-2.05	10.90
Grab	3942	0.16	99.84	0.00	---	---	1.26	0.41	-1.43	23.43
Grab	3962	0.11	70.93	28.96	27.07	1.89	2.82	2.39	0.92	2.54
Section 1										
0-18 cm	3936	0.00	100.00	0.00	---	---	1.85	0.25	0.55	3.96
18-32 cm	3937	0.00	100.00	0.00	---	---	1.82	0.28	0.35	4.94
32-52 cm	3938	0.00	100.00	0.00	---	---	1.86	0.26	0.55	4.91
52-64 cm	3939	0.00	100.00	0.00	---	---	1.84	0.25	0.84	4.23
Core										
1-3 cm	3867	0.60	99.40	0.00	---	---	1.69	0.66	-2.98	18.55
10-12 cm	3868	0.00	99.93	0.07	---	---	2.14	0.25	0.52	15.87

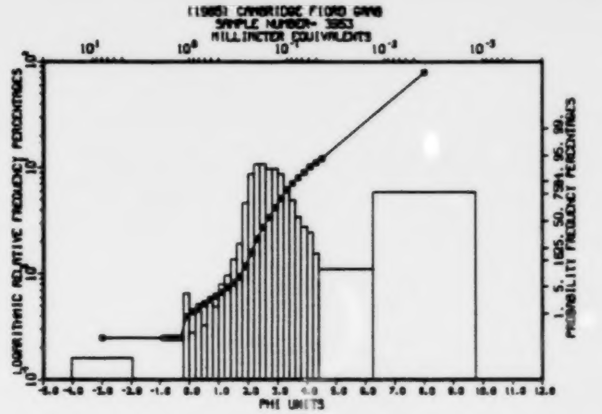
SAMPLE	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	SD Ø	SK	KURT
18-20 cm	3869	0.00	99.89	0.11	---	---	2.07	0.30	0.30	11.34
30-32 cm	3870	0.00	99.94	0.06	---	---	2.16	0.23	1.20	12.68
45-48 cm	3871	0.00	99.97	0.03	---	---	1.90	0.35	-0.25	8.46
CLYDE INLET										
Section 1										
0-2 cm	3927	1.65	50.68	47.67	30.88	16.79	4.50	3.13	0.55	2.87
4-8 cm	3928	0.66	91.55	7.78	---	---	2.02	1.73	2.52	9.93
10-12 cm	3922	0.00	100.00	0.00	---	---	1.48	0.41	0.18	3.79
15-20 cm	3929	15.28	84.72	0.00	---	---	0.25	1.50	-1.29	3.60
24-25 cm	3923	6.63	88.98	4.39	---	---	1.28	1.82	1.07	9.14
Grab	3925	0.00	95.38	4.62	---	---	2.55	1.20	3.58	16.63
Grab	3926	0.11	2.50	97.39	32.33	65.06	8.93	2.43	-0.69	3.19
Grab	3924	8.64	90.71	0.65	---	---	1.08	1.50	-1.45	5.24
Grab	3930	0.00	98.50	1.50	---	---	2.24	0.63	0.75	3.82
COUTTS INLET										
Core 1-1										
4-7 cm	3545	0.00	99.86	0.14	---	---	1.00	0.56	2.92	14.52
8-10 cm	3543	0.00	99.93	0.07	---	---	1.66	0.33	1.68	12.44
12-17 cm	3544	0.00	99.96	0.04	---	---	1.44	0.36	1.44	10.16
17-22 cm	3546	0.00	99.94	0.06	---	---	1.49	0.42	2.01	12.19
Core 1-2										
0-3 cm	3872	0.00	100.00	0.00	---	---	1.10	0.53	0.05	4.59
3.5-5 cm	3873	0.00	100.00	0.00	---	---	1.70	0.33	0.48	7.17
12.5-15 cm	3874	0.00	100.00	0.00	---	---	1.54	0.35	0.60	6.78
21-23 cm	3875	0.00	100.00	0.00	---	---	1.44	0.33	0.80	9.82
29-32 cm	3876	0.00	99.97	0.03	---	---	1.38	0.35	1.24	11.54
38-41 cm	3877	0.00	100.00	0.00	---	---	1.26	0.36	0.89	10.34
Core 1-3										
0-4 cm	3547	5.30	94.62	0.08	---	---	0.84	1.14	-1.84	7.33
5-7 cm	3548	1.30	98.70	0.00	---	---	1.10	0.73	-2.21	14.72
13-16 cm	3549	0.00	100.00	0.00	---	---	0.94	0.39	1.69	11.44
16-18 cm	3550	0.30	99.63	0.07	---	---	1.29	0.46	-2.16	27.91
19-21 cm	3551	0.00	100.00	0.00	---	---	1.28	0.43	0.86	8.01
22-26 cm	3552	0.00	99.99	0.01	---	---	1.37	0.35	1.28	12.92
MCBETH FIORD										
Core 1										
0-3 cm	3566	2.48	91.26	6.26	---	---	1.90	1.76	1.62	9.16
3-5 cm	3567	0.00	56.56	43.44	35.63	7.82	4.02	2.30	1.35	4.84
18-20 cm	3568	0.24	45.54	54.22	45.65	8.57	4.48	2.37	1.02	4.41
38-40 cm	3569	0.00	19.91	80.09	60.21	19.88	6.01	2.55	0.58	2.92
55-60 cm	3570	0.00	8.92	91.08	66.99	24.09	6.55	2.33	0.69	2.87
Core 2										
19-21 cm	3878	0.00	84.01	15.99	11.29	4.70	3.42	1.79	2.85	11.36
21-21.5 cm	3879	0.00	11.01	88.99	48.76	40.23	7.39	2.66	0.18	1.93
22-24 cm	3880	0.00	16.90	83.10	70.88	12.23	5.59	1.93	1.55	5.16
25-26 cm	3881	0.00	12.91	87.09	74.20	12.89	5.71	1.95	1.57	5.08
27-29 cm	3882	0.00	37.84	62.16	49.07	13.10	5.23	2.41	1.16	3.85
29.5-32 cm	3883	0.00	63.36	36.64	30.18	6.46	4.36	1.78	2.45	9.14
35-37 cm	3884	0.00	87.70	12.30	7.88	4.42	3.49	1.68	3.48	15.45
40-42 cm	3885	0.00	13.88	86.12	61.05	25.07	6.64	2.47	0.63	2.69
43-44.5 cm	3886	0.00	88.62	11.38	7.21	4.17	3.24	1.72	3.35	14.75
52-53 cm	3887	0.00	26.76	73.24	60.58	12.67	5.56	2.17	1.31	4.36
Grab	3918	0.00	4.29	95.71	49.46	46.25	7.85	2.66	-0.06	2.19
Grab	3919	0.06	87.68	12.26	---	---	3.18	1.45	2.32	8.65

APPENDIX 2 (continued)

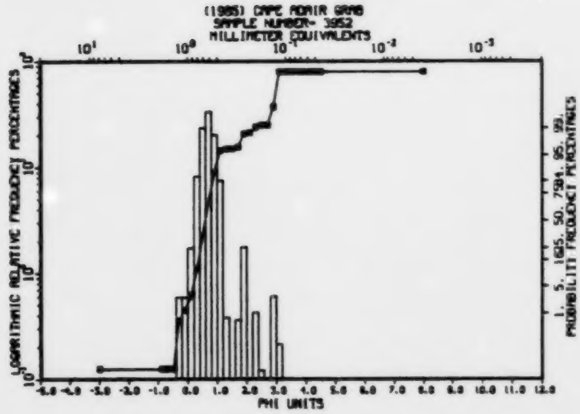
SAMPLE	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	SD Ø	SK	KURT
Section 1										
37-47 cm	3920	0.86	99.14	0.00	---	---	1.12	0.66	-1.63	14.96
50 cm	3932	38.14	61.59	0.27	---	---	-0.34	1.23	0.47	4.60
70 cm	3921	6.07	83.50	10.43	---	---	1.93	2.12	0.08	4.25
115 cm	3931	1.04	59.96	39.00	36.26	2.74	3.88	1.64	0.19	9.30
Grab	3917	0.00	11.61	88.39	78.16	10.24	5.64	1.71	1.42	5.33
Grab	3933	0.02	6.86	93.12	46.61	46.51	7.87	2.70	-0.27	2.54
Grab	3935	0.07	8.78	91.15	42.66	48.49	7.77	2.96	-0.29	2.20
BYLOT ISLAND										
MIDDLE BAY										
Core 2-1										
8-10 cm	3888	0.00	100.00	0.00	---	---	1.88	0.32	0.08	8.24
10-12 cm	3889	0.00	100.00	0.00	---	---	1.72	0.38	-0.09	6.16
23.5-26 cm	3890	0.00	99.96	0.04	---	---	1.85	0.36	0.12	6.38
45-48 cm	3891	0.00	100.00	0.00	---	---	1.78	0.30	0.60	7.68
48-50.5 cm	3892	0.00	100.00	0.00	---	---	1.60	0.33	0.64	6.04
Core 2-2										
10-12 cm	3893	0.00	99.99	0.01	---	---	1.82	0.29	0.77	7.79
17-19 cm	3894	0.00	99.94	0.06	---	---	1.34	0.50	0.46	4.32
24-27 cm	3895	0.00	99.94	0.06	---	---	1.89	0.34	0.41	7.09
40-42 cm	3896	0.00	100.00	0.00	---	---	1.70	0.44	0.12	5.01
48-50 cm	3897	0.00	99.99	0.01	---	---	2.07	0.28	0.67	16.66
52-53 cm	3898	0.00	100.00	0.00	---	---	1.97	0.29	0.88	12.77
Core 2-3										
8-10.5 cm	3899	0.00	99.94	0.06	---	---	1.72	0.39	0.21	5.85
15-17.5 cm	3900	0.00	99.92	0.08	---	---	1.75	0.38	0.27	7.76
25.7-26.2 cm	3901	0.00	99.95	0.05	---	---	1.73	0.31	0.89	7.65
27.5-29.3 cm	3902	0.00	99.96	0.04	---	---	1.93	0.29	0.93	9.49
38.5-42 cm	3903	0.00	95.59	4.41	---	---	2.09	1.32	3.84	17.49
48.5-50.5 cm	3904	0.00	99.97	0.03	---	---	1.52	0.47	-0.11	5.65
Core 2-4										
4-6 cm	3905	0.00	86.07	13.93	8.10	5.83	2.76	2.24	2.42	7.96
10-12 cm	3906	0.00	98.90	1.10	---	---	1.90	0.76	5.61	46.99
16-18 cm	3907	0.00	81.46	18.54	8.21	10.33	3.17	2.78	1.94	5.42
26-28 cm	3908	0.00	94.22	5.78	2.66	3.12	2.21	1.64	3.99	19.17
29-31 cm	3909	0.00	91.41	8.59	3.71	4.88	2.56	1.92	3.25	12.95
36-38 cm	3910	0.00	99.27	0.73	---	---	1.79	0.66	5.65	54.44
45-46.5 cm	3911	0.00	97.17	2.83	---	---	2.23	1.04	4.69	26.45
49-51 cm	3912	0.00	99.50	0.50	---	---	1.87	0.56	6.43	72.48
Grab	3954	0.01	99.99	0.00	---	---	1.70	0.35	-0.62	8.59
Grab	3957	0.00	100.00	0.00	---	---	1.75	0.27	0.61	6.39
Grab	3955	0.04	99.53	0.43	---	---	1.71	0.46	0.42	12.83
Grab	3956	1.18	91.58	7.24	---	---	2.35	1.70	1.86	8.92
Grab	3959	0.00	95.38	4.62	---	---	2.40	1.26	3.47	15.74
SOUTHBAY										
Grab	3958	68.29	23.81	7.90	6.32	1.58	-1.39	3.36	1.16	3.61
BATHURST BAY										
Grab	3963	7.28	23.91	68.81	55.09	13.71	4.94	3.18	-0.72	3.87

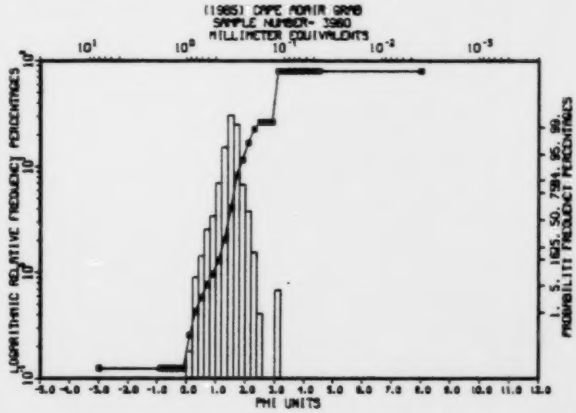
APPENDIX 2 (continued)

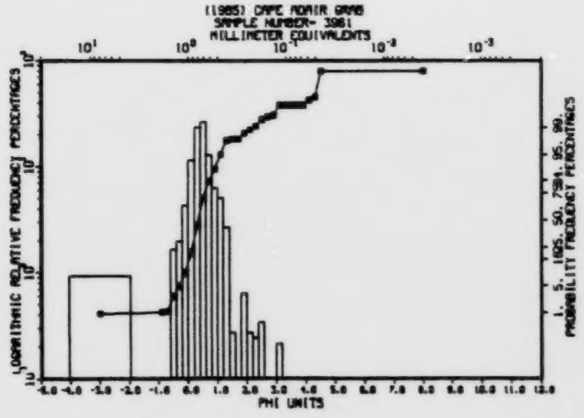
CAMBRIDGE FIORD GRAB



CAPE ADAIR GRABS

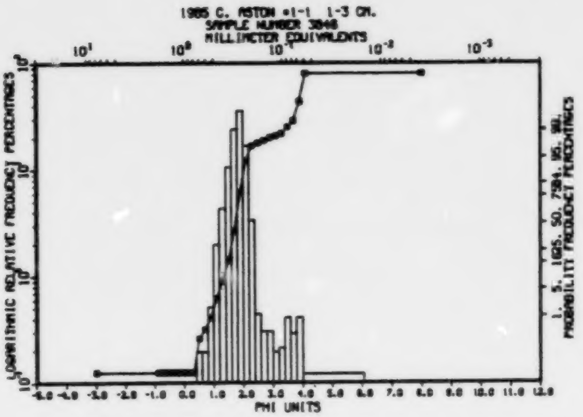


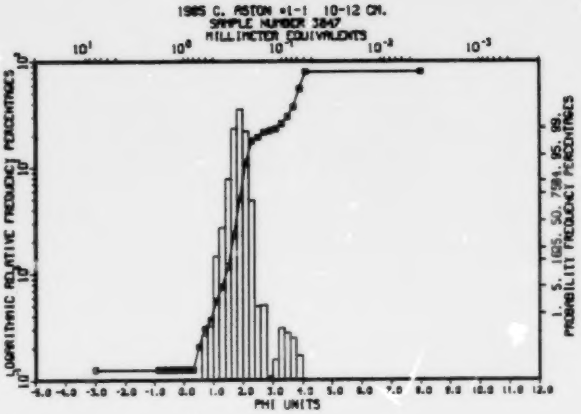


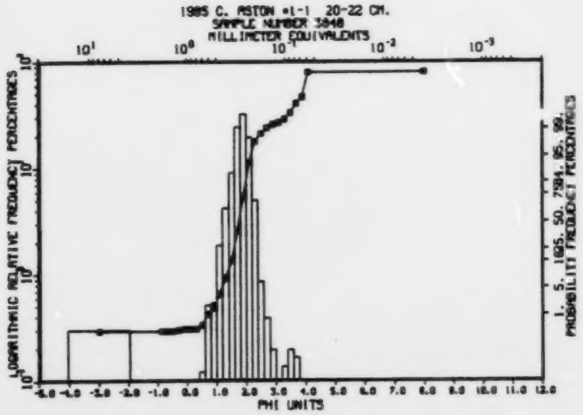


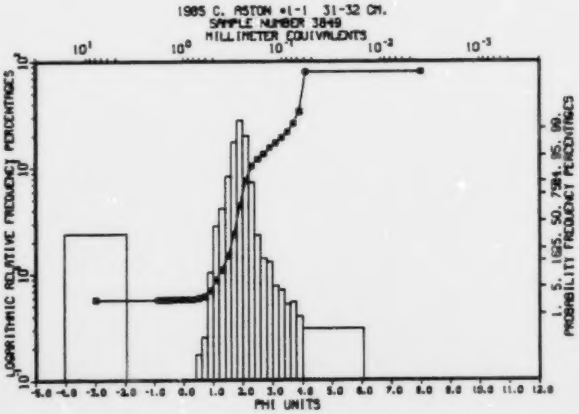
APPENDIX 2 (continued)

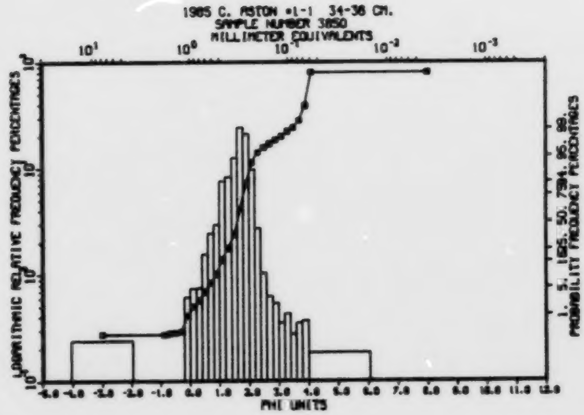
CAPE ASTON CORE 1-1

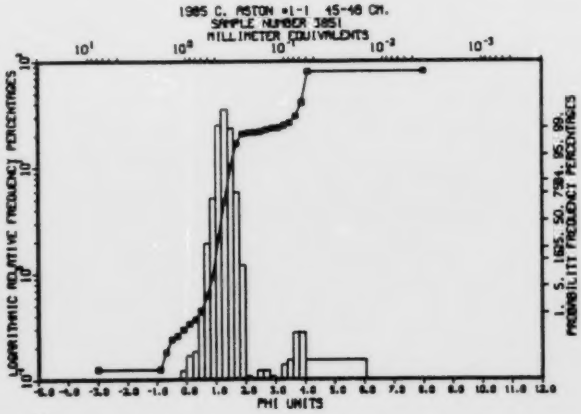






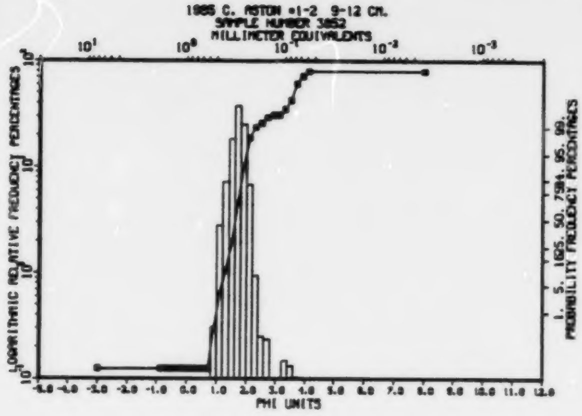


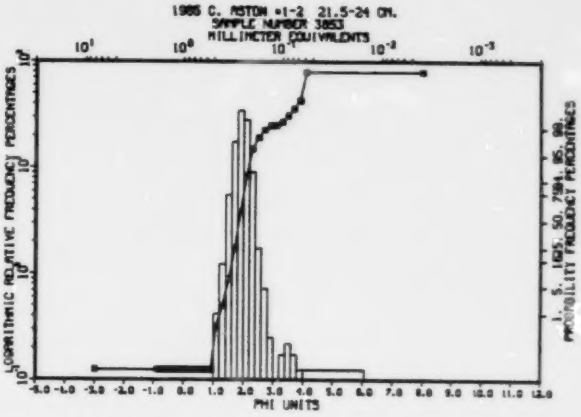


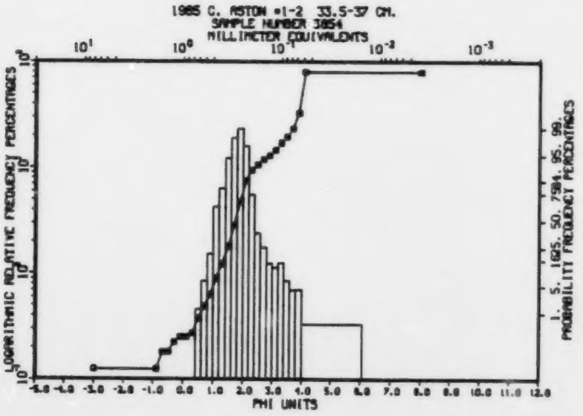


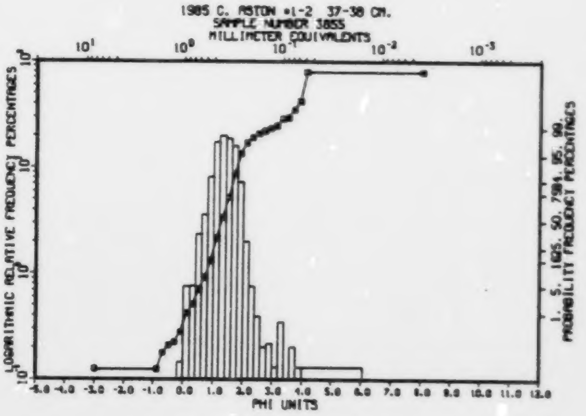
APPENDIX 2 (continued)

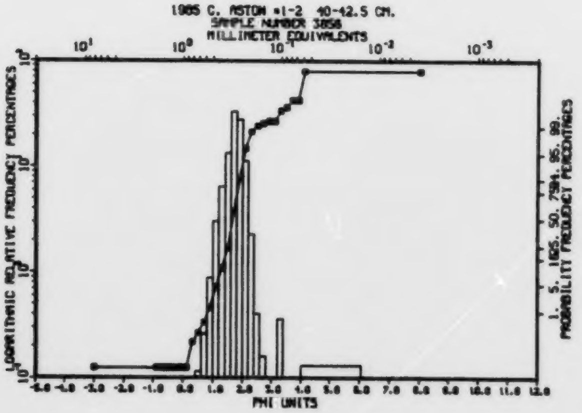
CAPE ASTON CORE 1-2



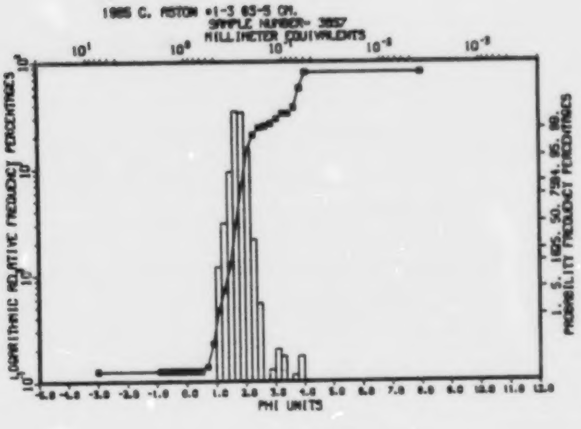


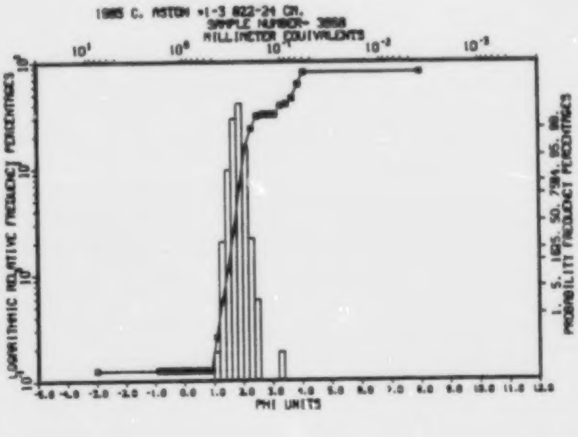


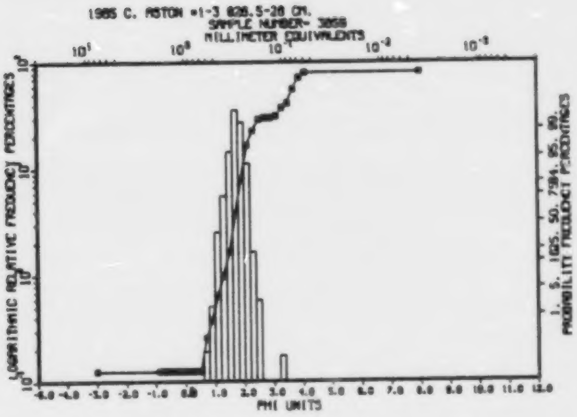


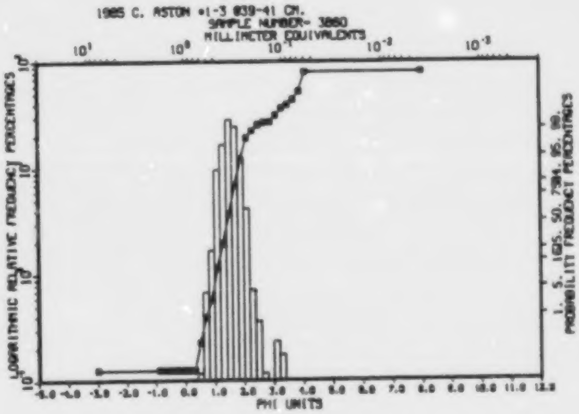


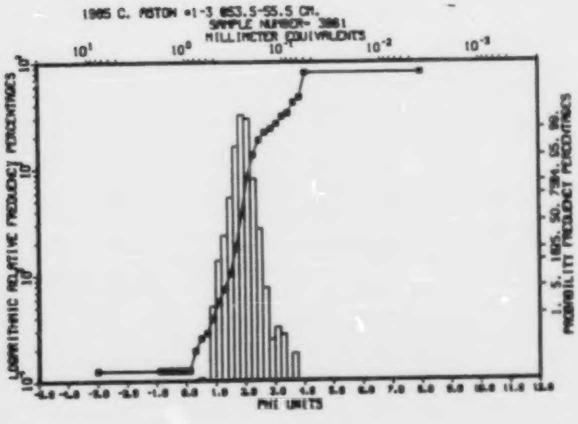
CAPE ASTON CORE 1-3





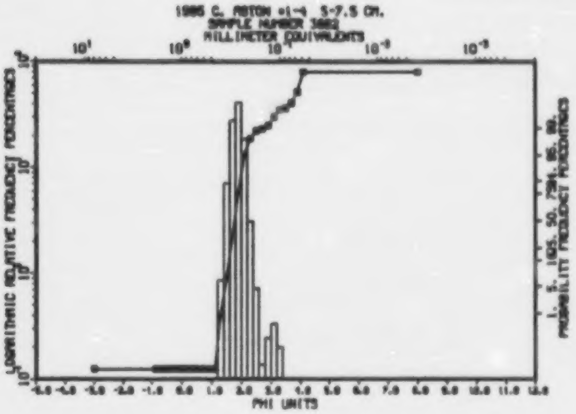


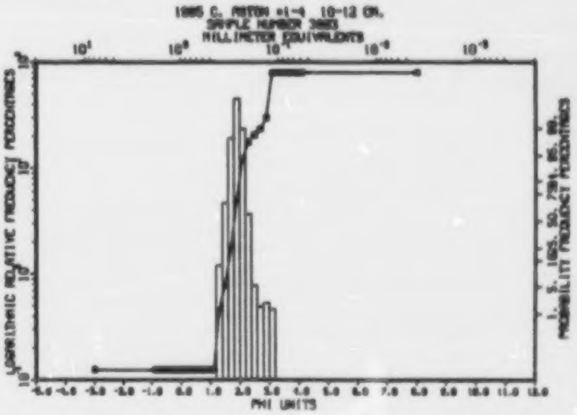


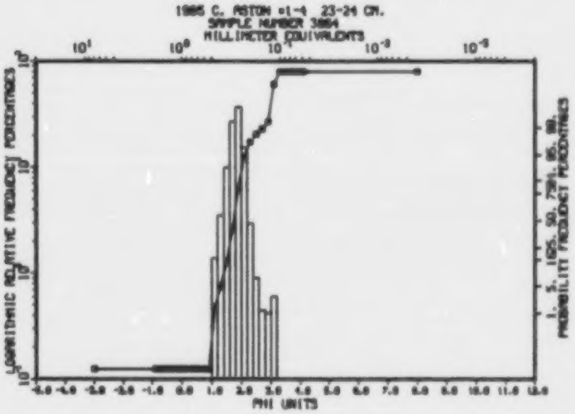


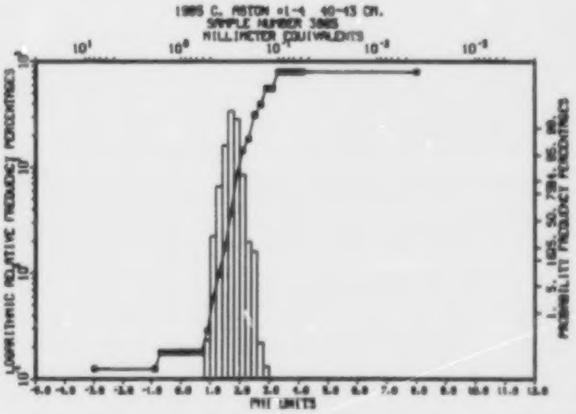
APPENDIX 2 (continued)

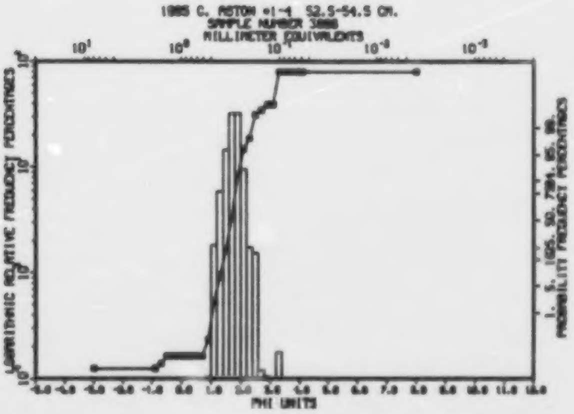
CAPE ASTON CORE 1-4





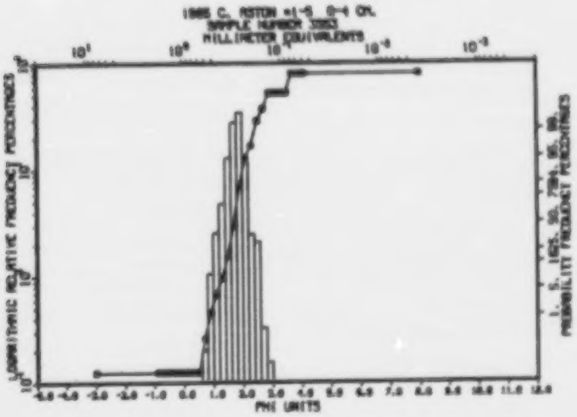


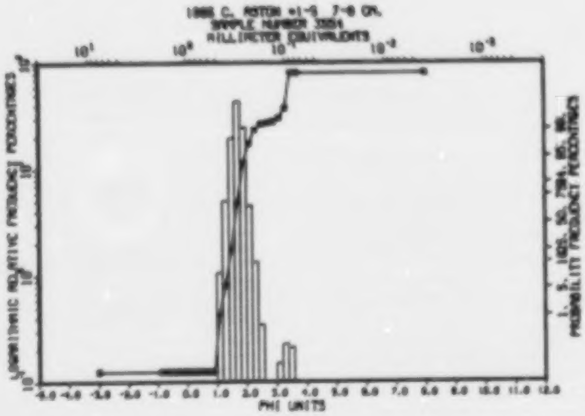


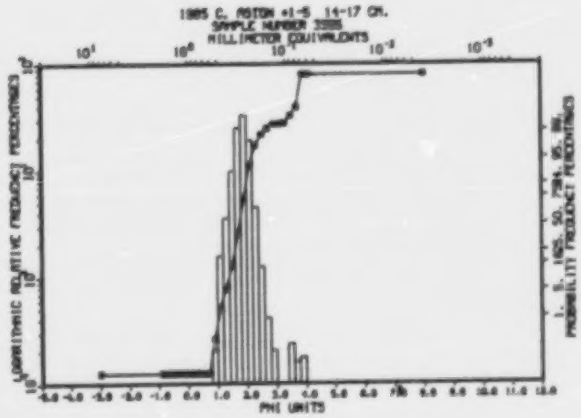


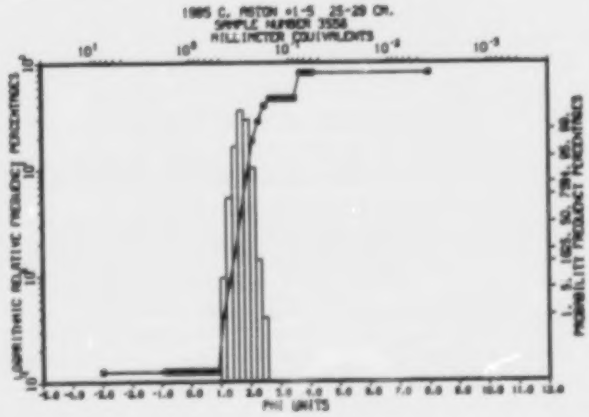
APPENDIX 2 (continued)

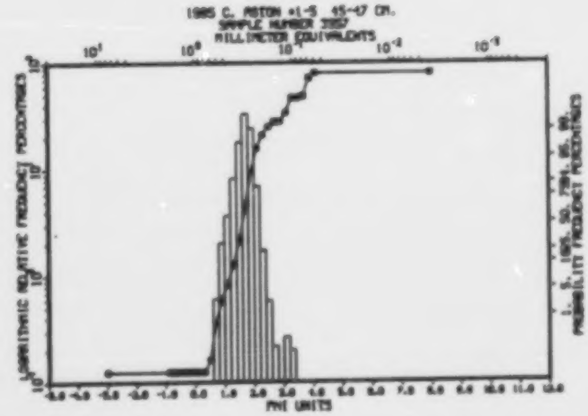
CAPE ASTON CORE 1-5

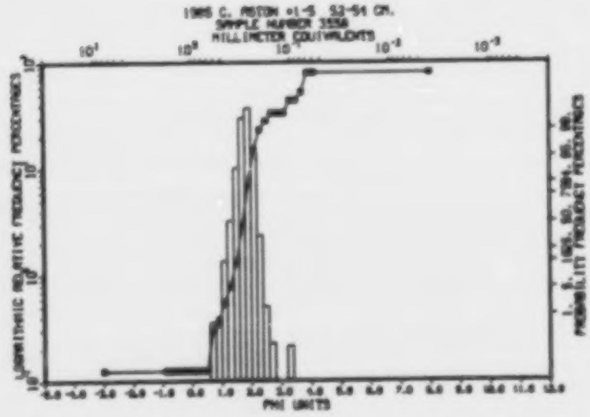






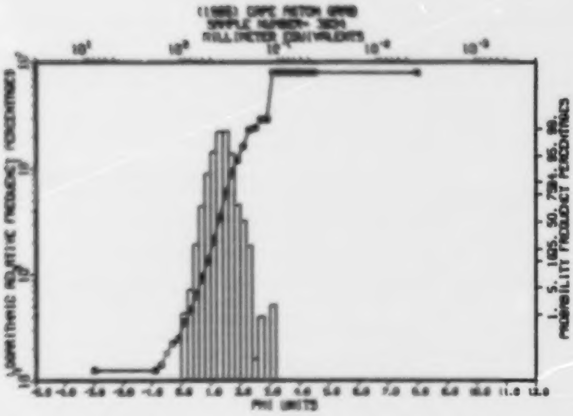


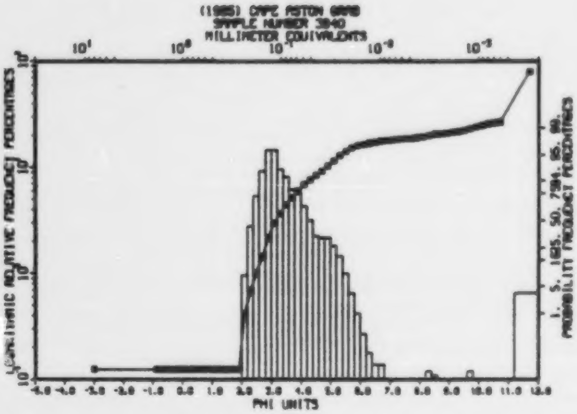


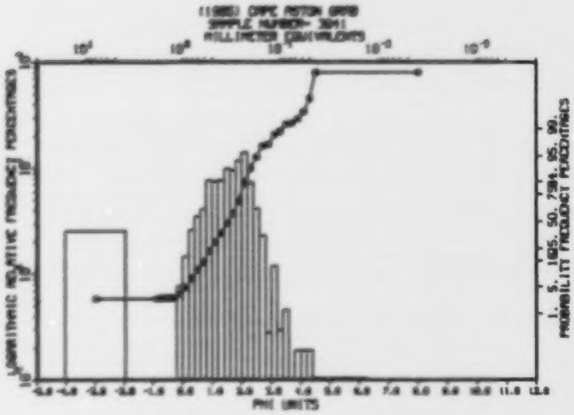


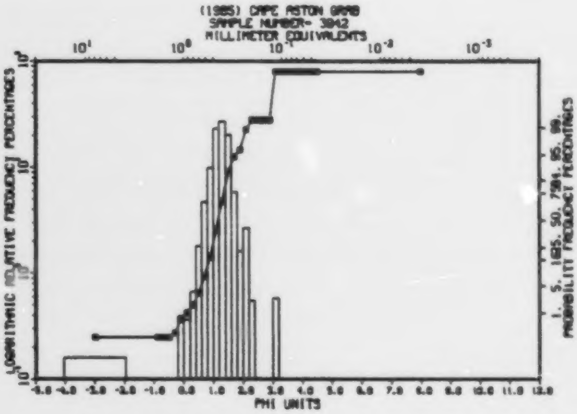
APPENDIX 2 (continued)

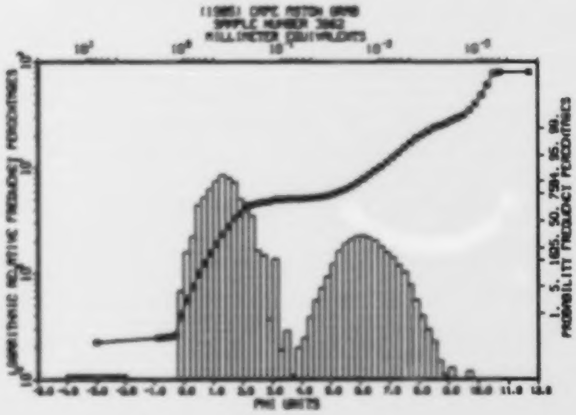
CAPE ASTON GRABS



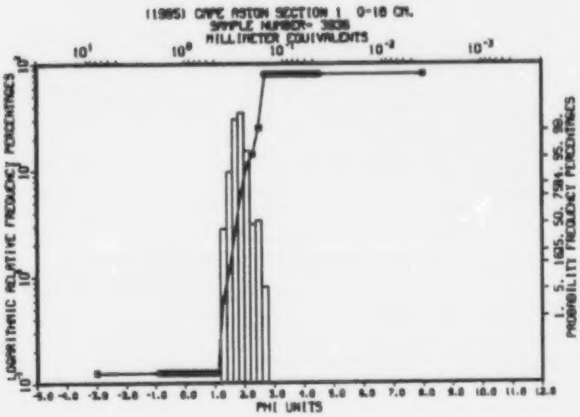


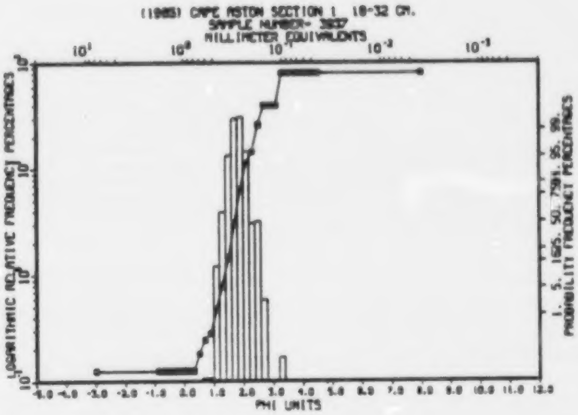


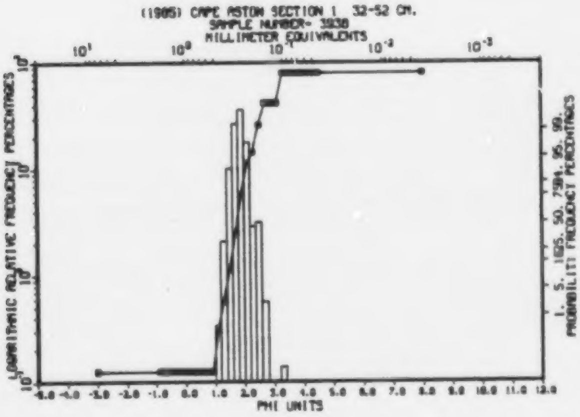


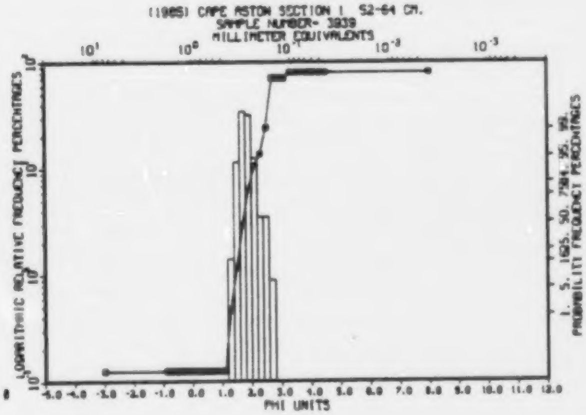


CAPE ASTON SECTION 1



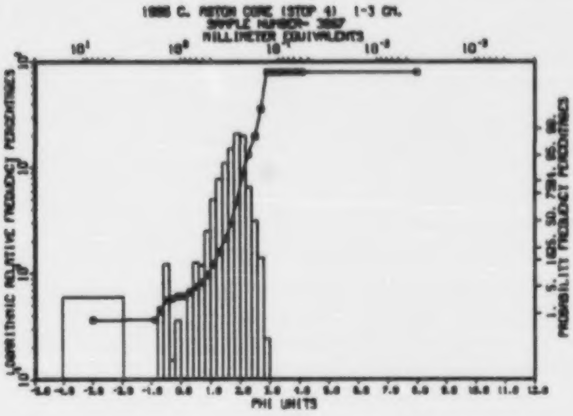




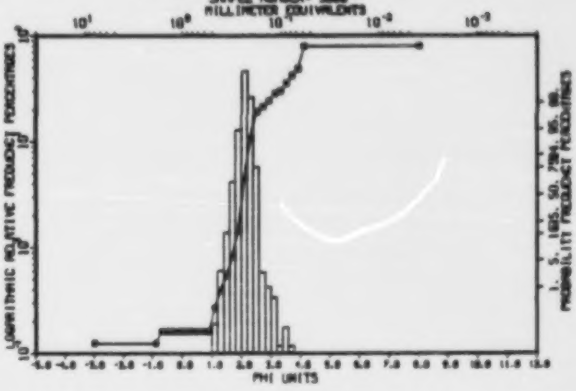


CAPE ASTON CORE (STOP 4)

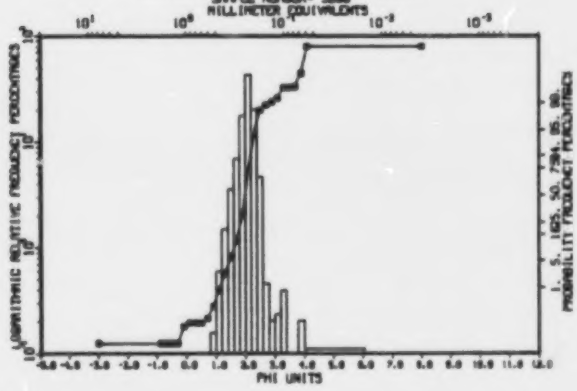
1985 C. ASTON CORE (STOP 4) 1-3 CM.
SAMPLE NUMBER- 3867



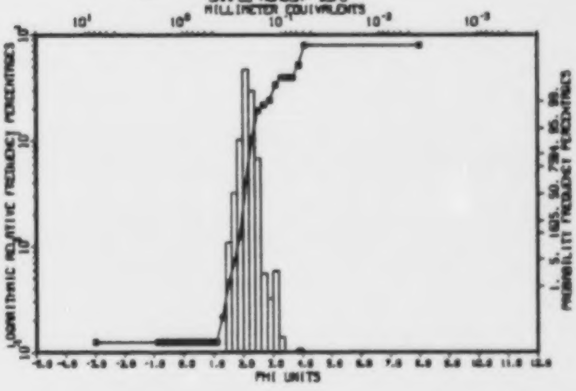
1985 C. ASTON CORE (STOP 4) 10-12 CM.
SAMPLE NUMBER- 3868



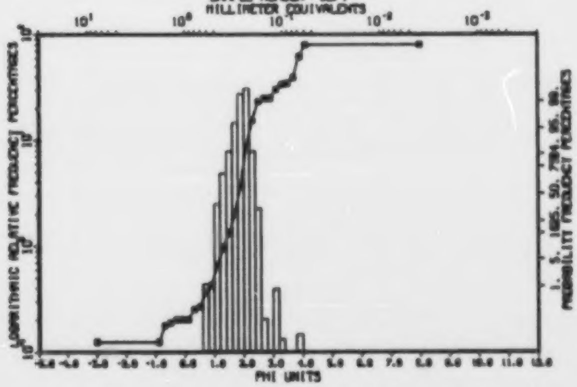
1985 C. ASTON CORE (STOP 4) 18-20 CM.
SAMPLE NUMBER- 3869



1985 C. ASTON CORE (STOP 4) 30-32 CM.
SAMPLE NUMBER- 3870

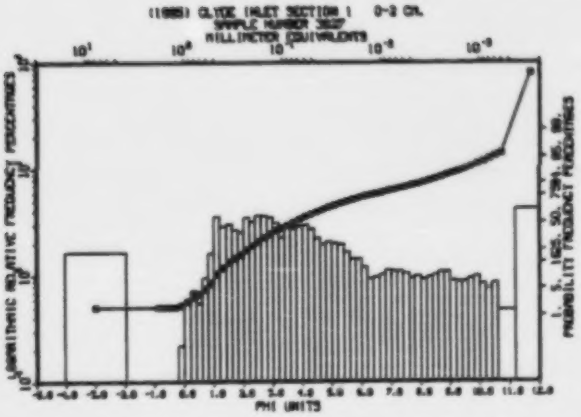


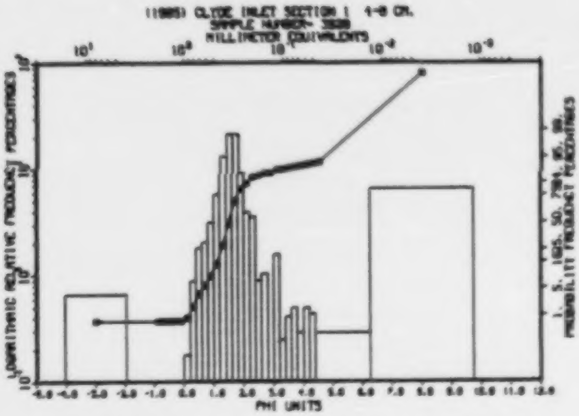
1985 C. ASTON CORE (STOP 4) 45-48 CM.
SAMPLE NUMBER- 3871

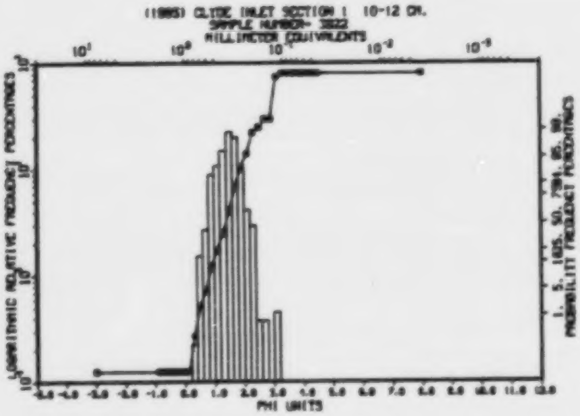


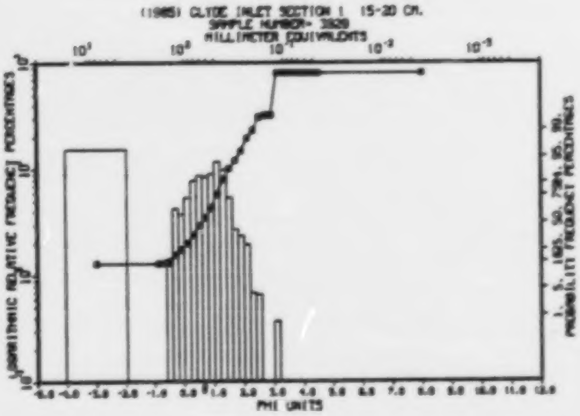
APPENDIX 2 (continued)

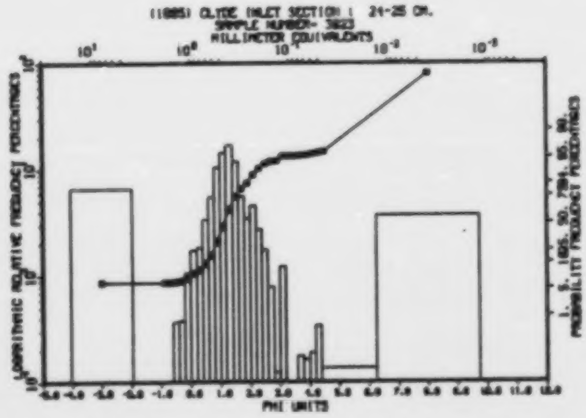
CLYDE INLET SECTION 1





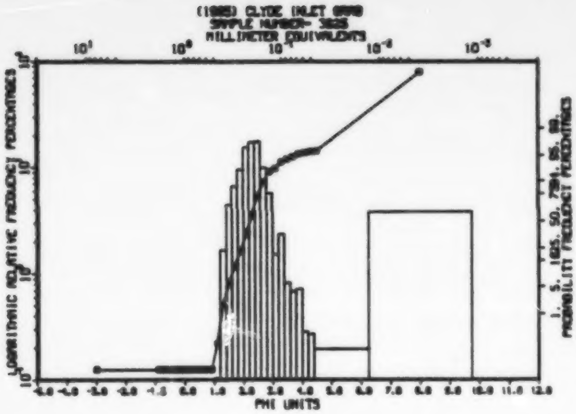


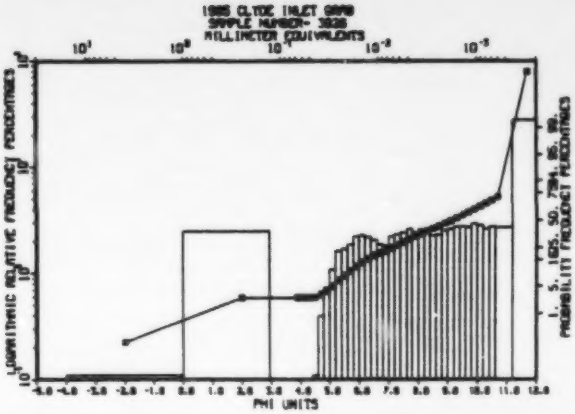


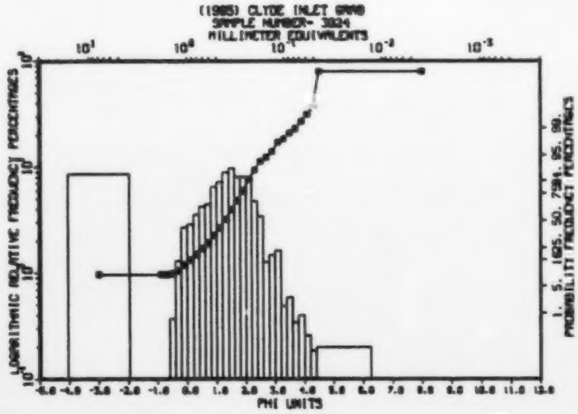


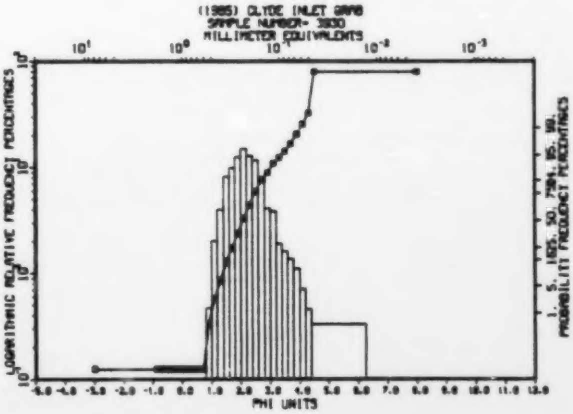
APPENDIX 2 (continued)

CLYDE INLET GRABS



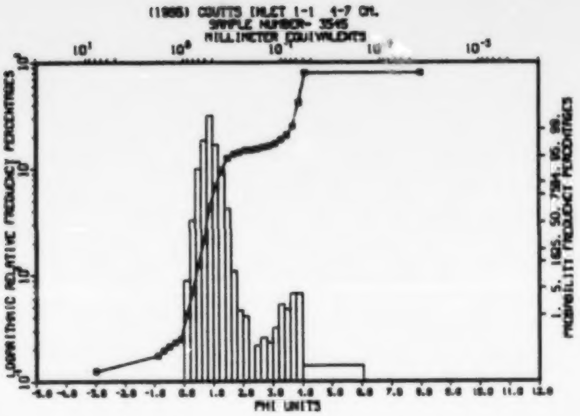


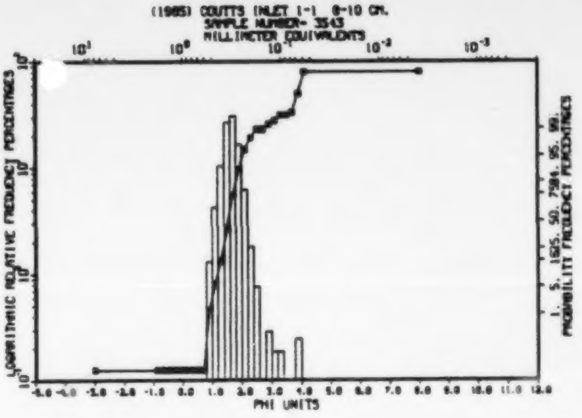


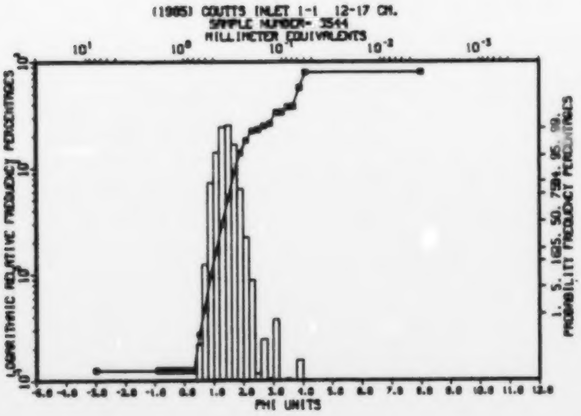


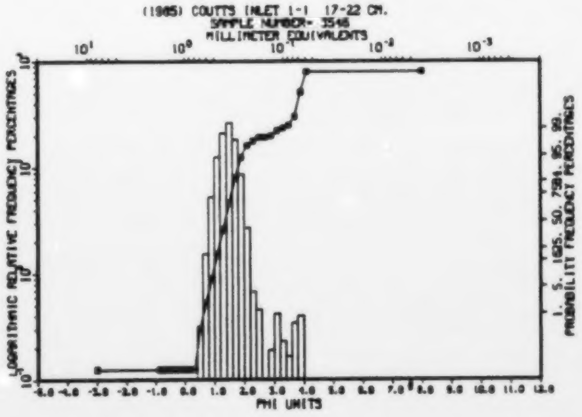
APPENDIX 2 (continued)

COUTTS INLET CORE 1-1

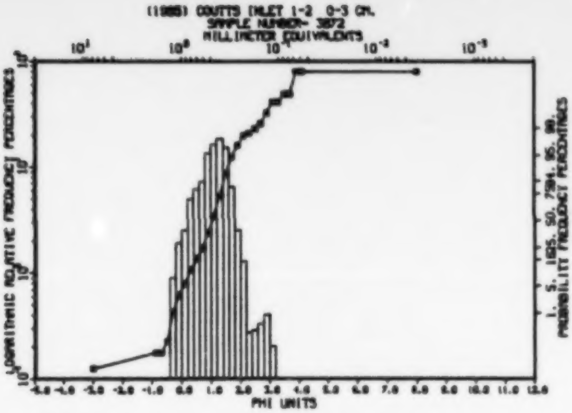


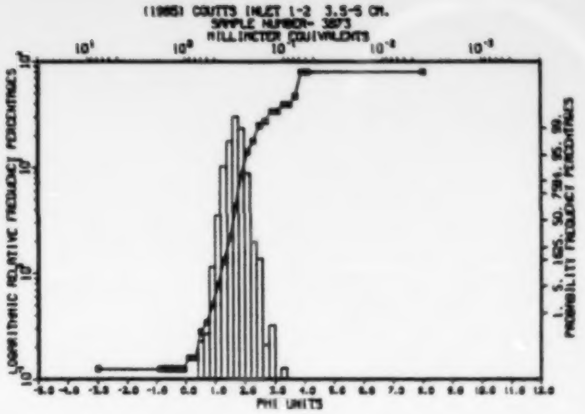


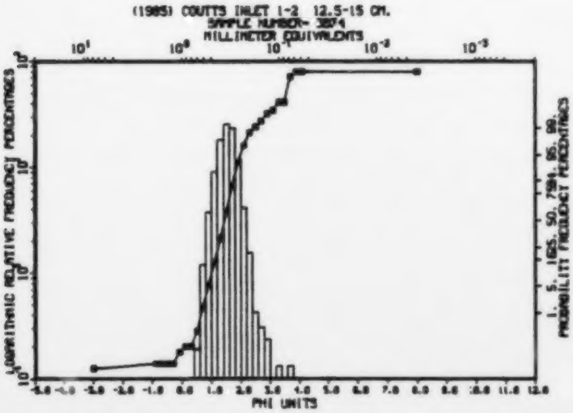


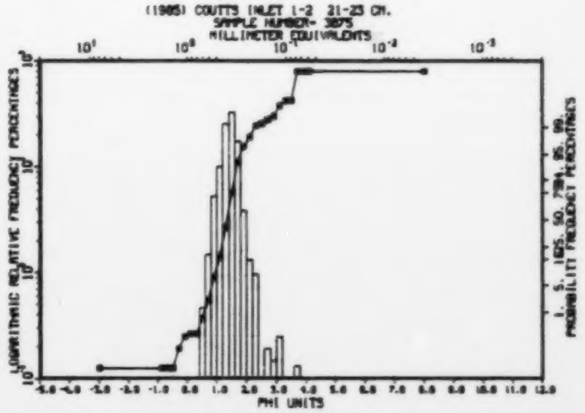


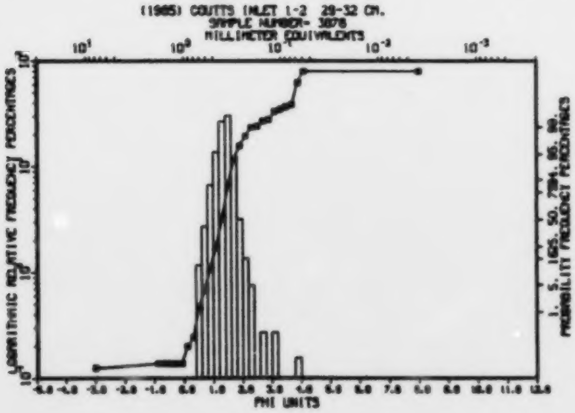
COUTTS INLET CORE 1-2

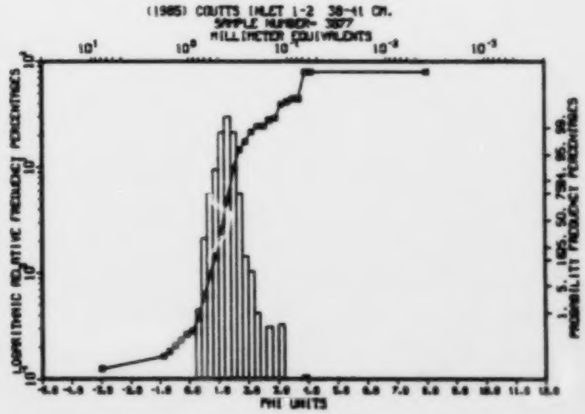








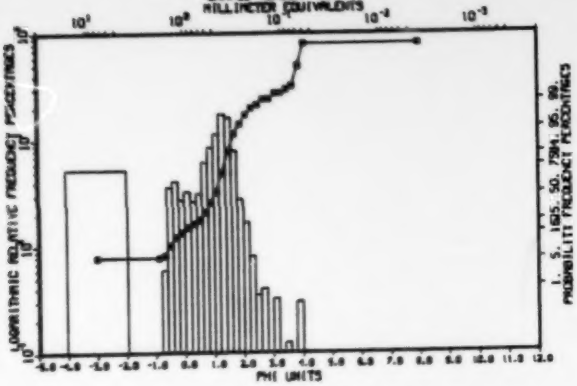




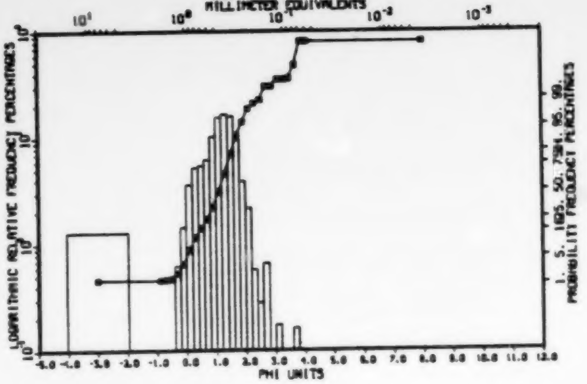
APPENDIX 2 (continued)

COUTTS INLET CORE 1-3

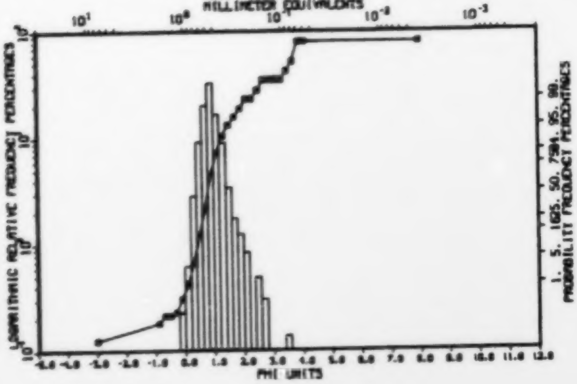
(1985) COUTTS INLET 1-3 0-4 CM.
SAMPLE NUMBER- 3547



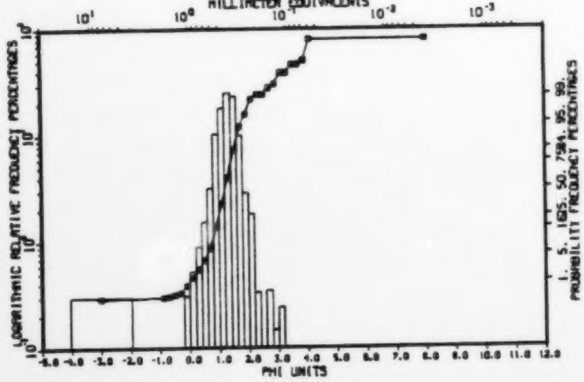
(1985) COUTTS INLET 1-3 5-7 CM.
SAMPLE NUMBER- 3548



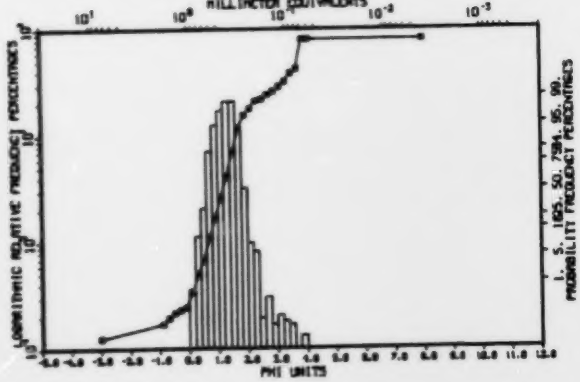
(1985) COUTTS INLET 1-3 13-16 CM.
SAMPLE NUMBER- 3549



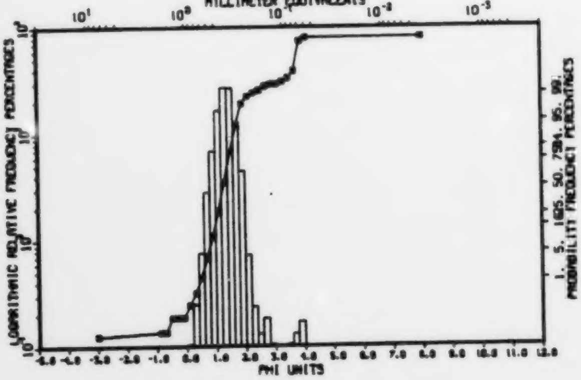
(1985) COUTTS INLET 1-3 16-18 CM.
SAMPLE NUMBER- 3550



(1985) COUTTS INLET 1-3 19-21 CM.
SAMPLE NUMBER- 3551

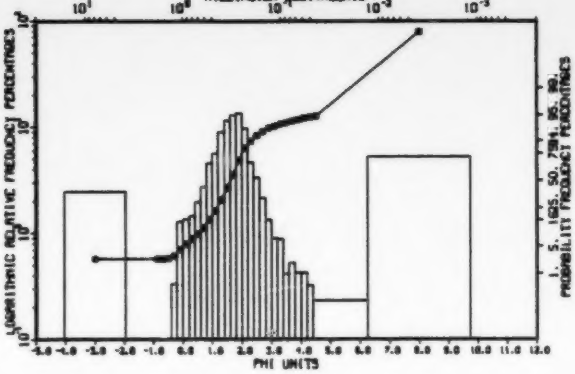


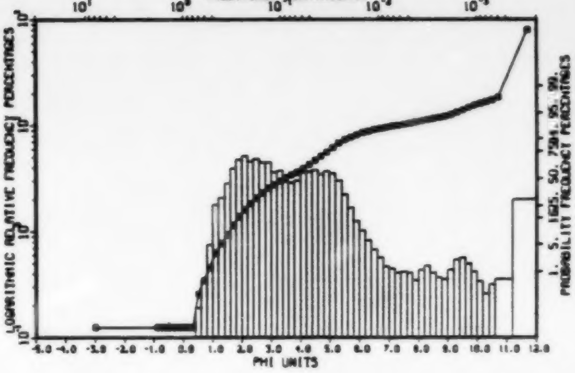
(1985) COUTTS INLET 1-3 22-26 CM.
SAMPLE NUMBER- 3552

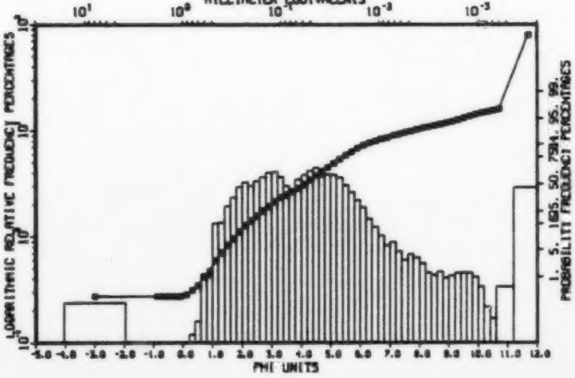


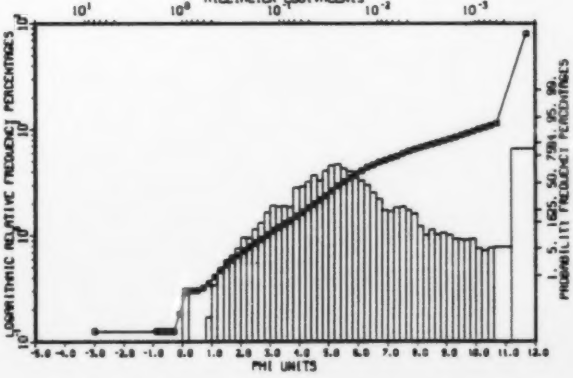
APPENDIX 2 (continued)

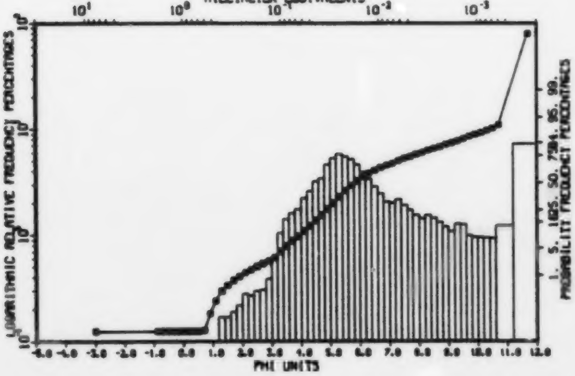
MCBETH FIORD CORE 1


(1983) MCBETH FIORD CORE 1 0-3 CM.
SAMPLE NUMBER= 3566


(1983) MCBETH FIORD CORE 1 3-5 CM.
SAMPLE NUMBER 3567


(1983) MCBETH FIORD CORE 1 18-20 CM.
SAMPLE NUMBER 3568

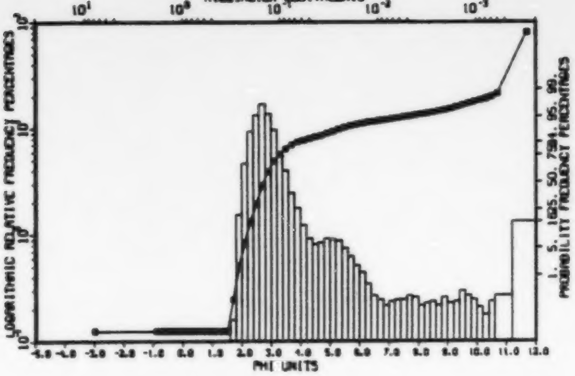

(1983) MCBETH FIORD CORE 1 38-40 CM.
SAMPLE NUMBER 3569


(1983) MCBETH FIORD CORE 1 55-60 CM.
SAMPLE NUMBER 3570

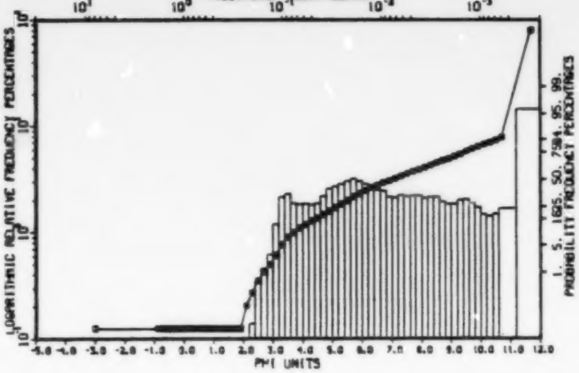
APPENDIX 2 (continued)

MCBETH FIORD CORE 2

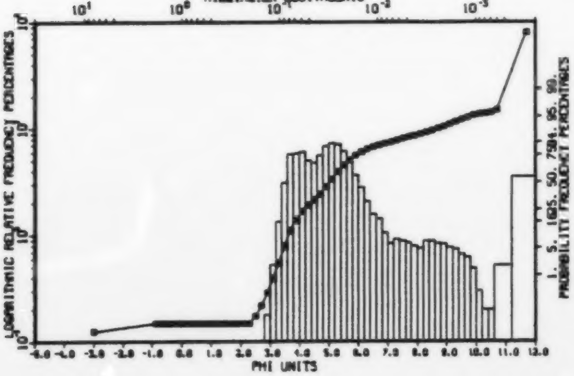
(1985) MCBETH FIORD CORE 2 19-21 CM.
SAMPLE NUMBER 3878
MILLIMETER EQUIVALENTS



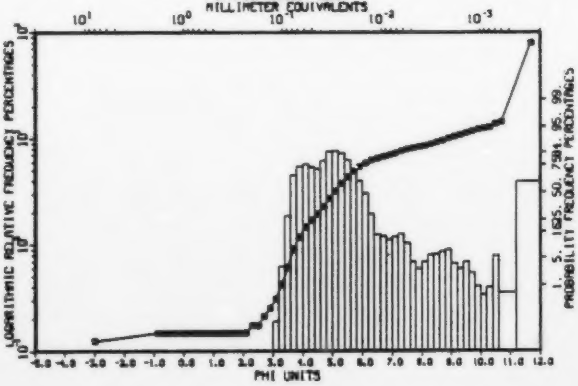
(1985) MCBETH FIORD CORE 2 21-21.5 CM.
SAMPLE NUMBER 3879
MILLIMETER EQUIVALENTS



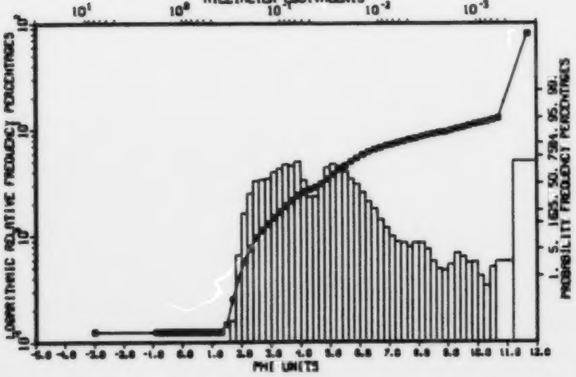
(1985) MCBETH FIORD CORE 2 22-24 CM.
SAMPLE NUMBER 3880
MILLIMETER EQUIVALENTS



(1985) MCBETH FIORD CORE 2 25-26 CM.
SAMPLE NUMBER 3881
MILLIMETER EQUIVALENTS



(1985) MCBETH FIORD CORE 2 27-29 CM.
SAMPLE NUMBER 3882
MILLIMETER EQUIVALENTS



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SAMPLE NUMBER 3883
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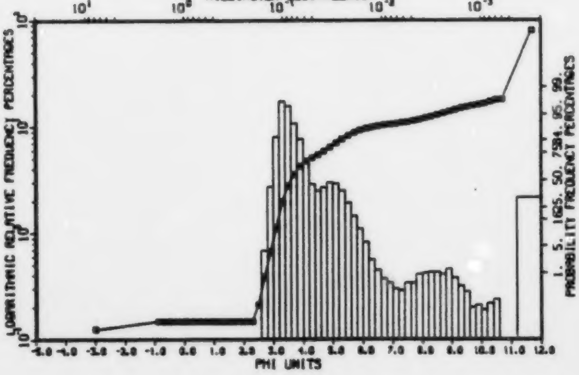
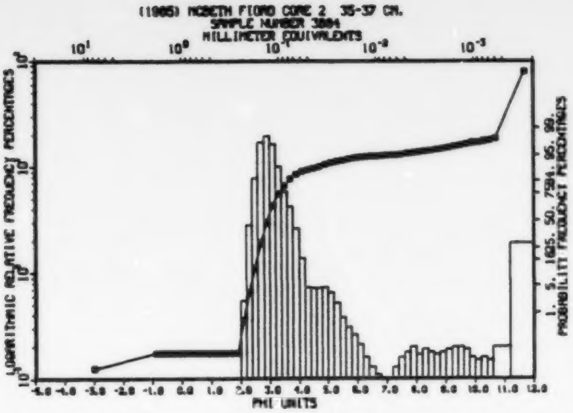
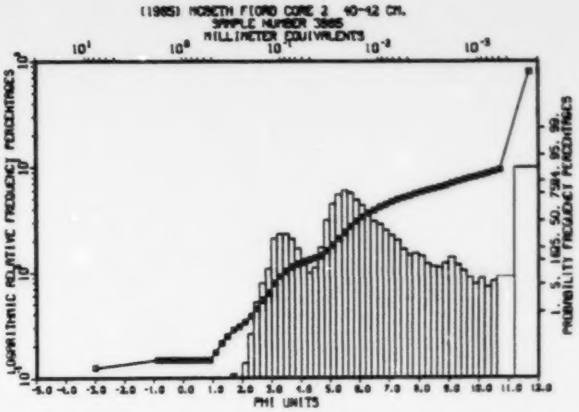
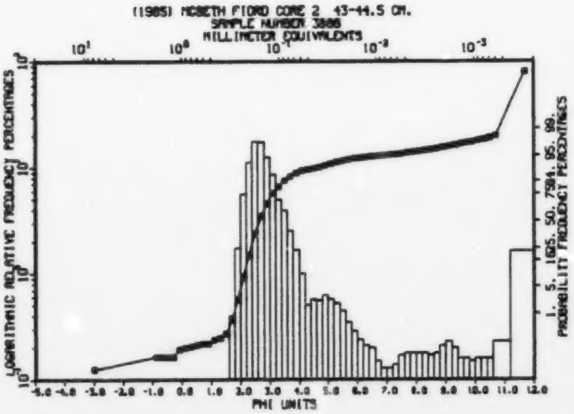


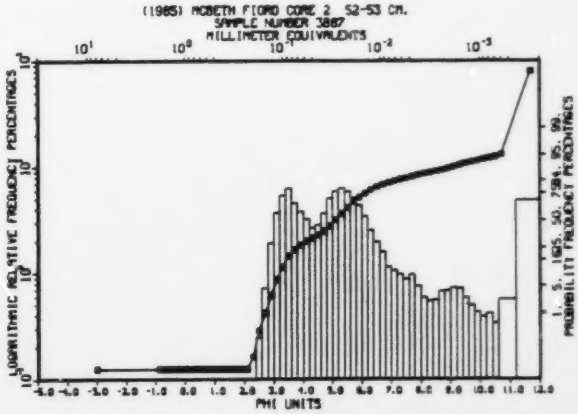
APPENDIX 2 (continued)

MCBETH FIORD CORE 2

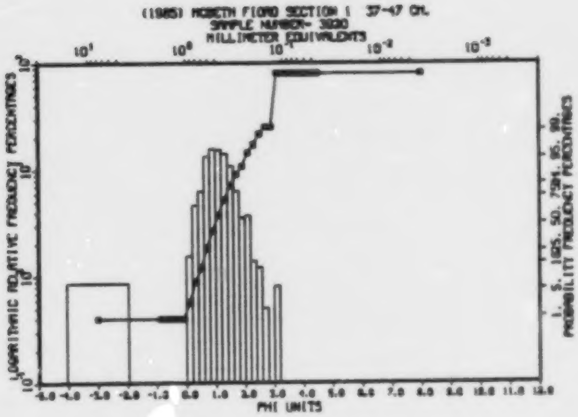




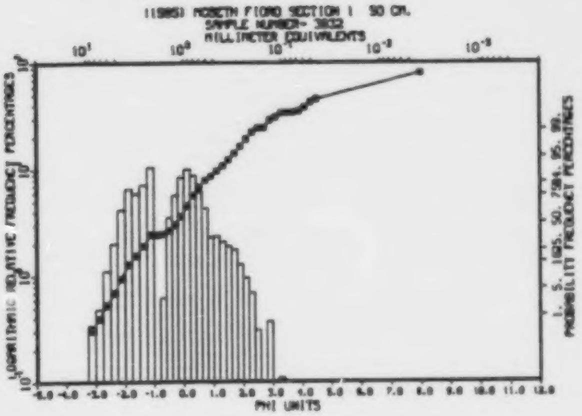




MCBETH FIORD SECTION 1



(1985) MCBETH FIORD SECTION 1 37-47 CM.
SAMPLE NUMBER- 3830
MILLIMETER EQUIVALENTS



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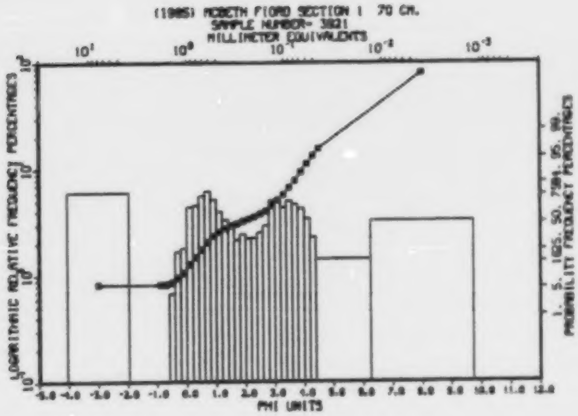
MILLIMETER EQUIVALENTS



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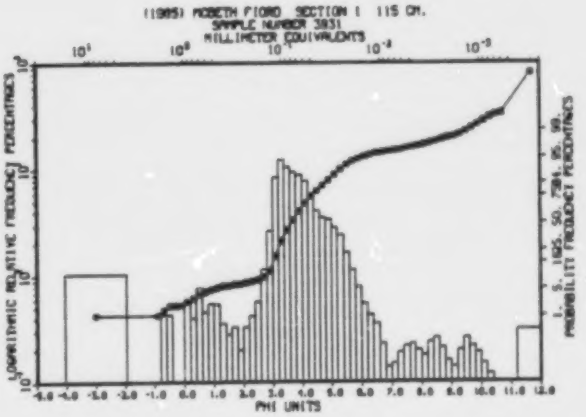
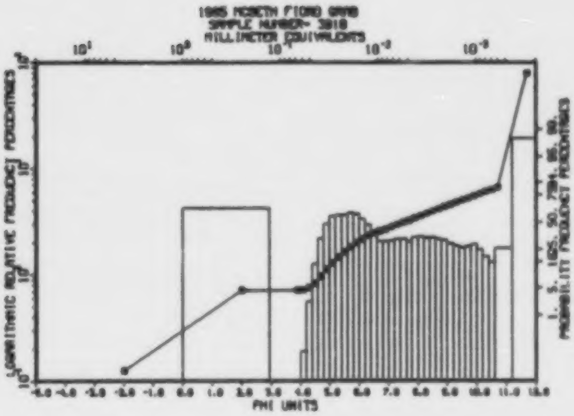
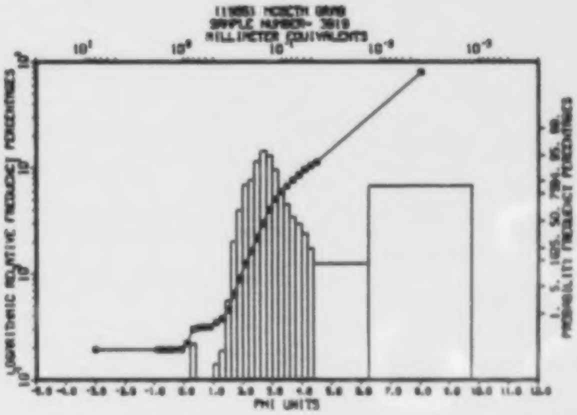
MILLIMETER EQUIVALENTS

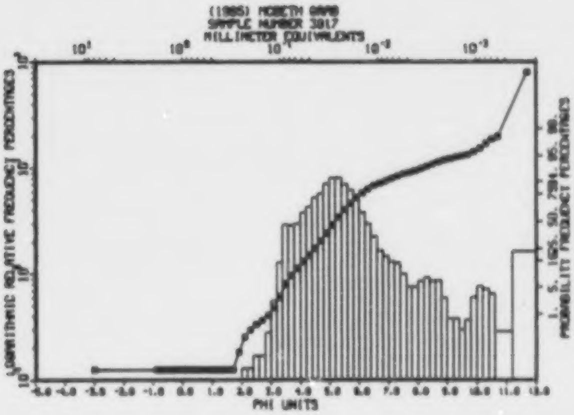


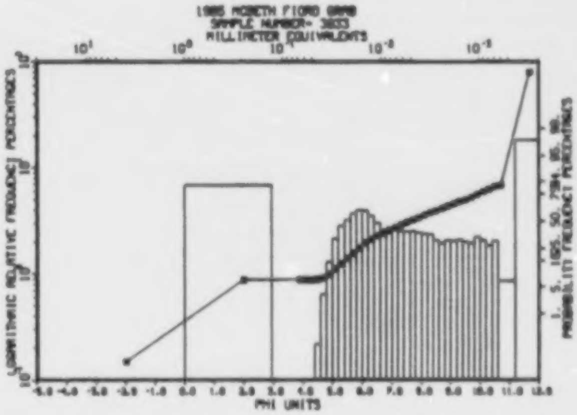
(1985) MCBETH FIORD SECTION 1 115 CM.
SAMPLE NUMBER 3831
MILLIMETER EQUIVALENTS

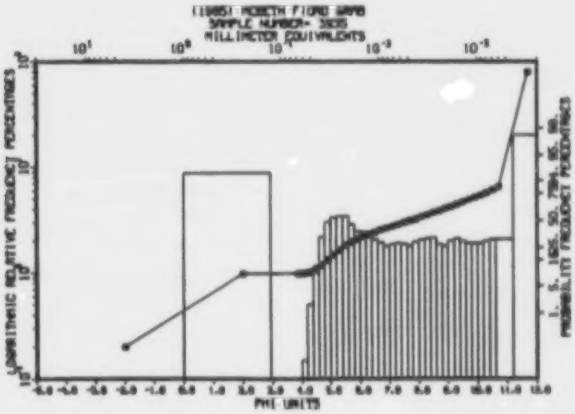
MCBETH FIORD GRABS





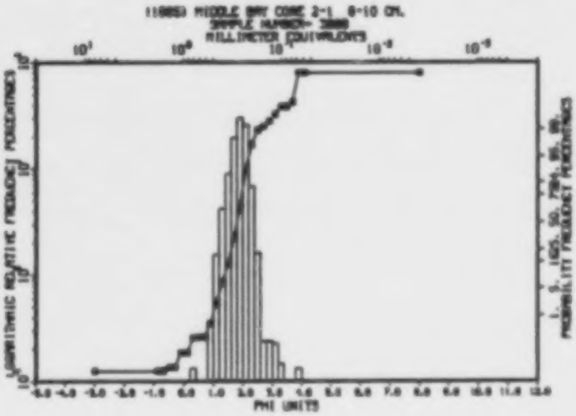


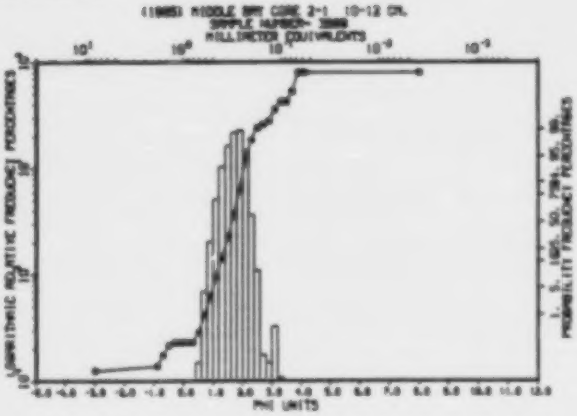


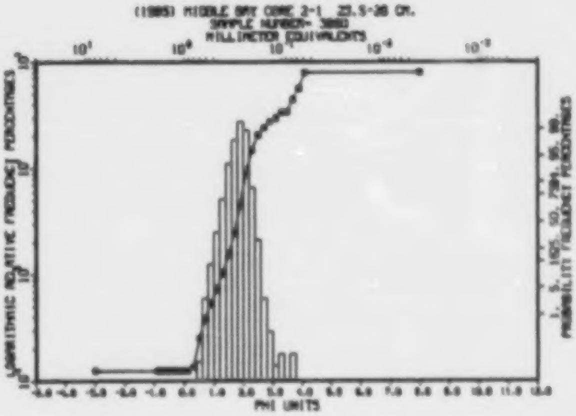


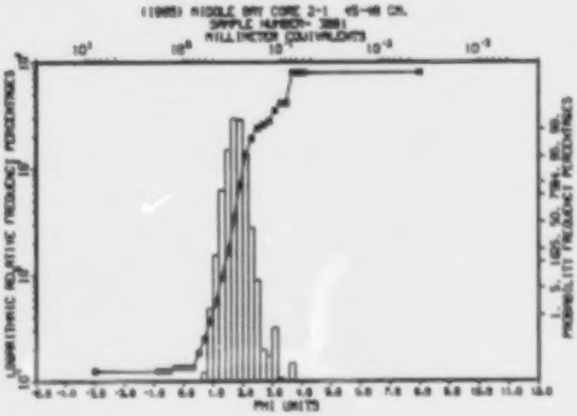
APPENDIX 2 (continued)

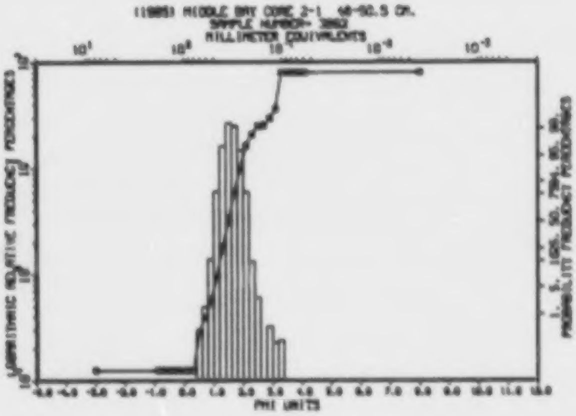
MIDDLE BAY CORE 2-1





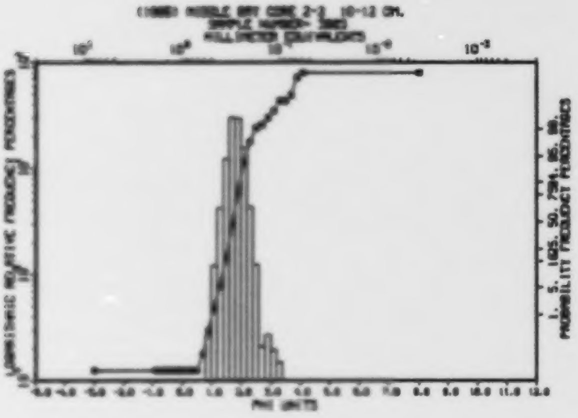


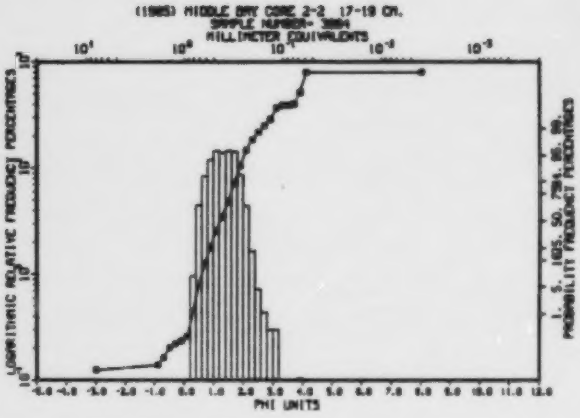


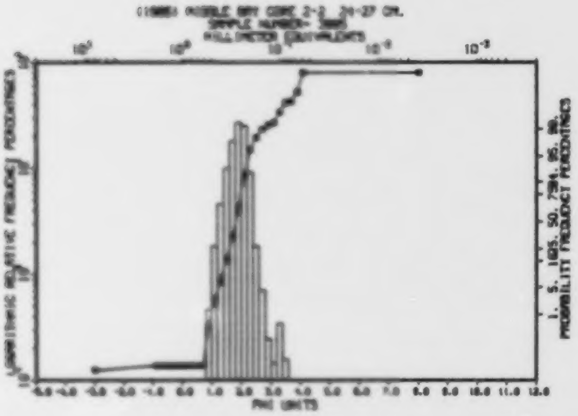


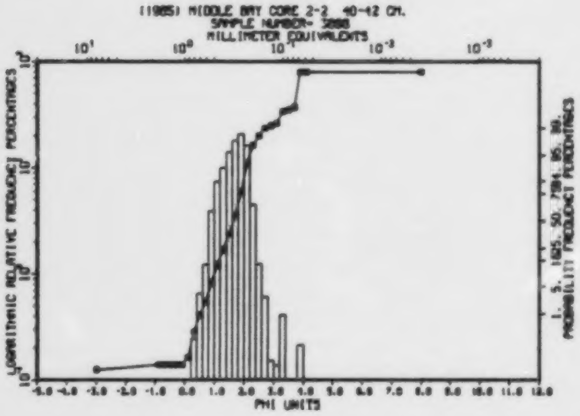
APPENDIX 2 (continued)

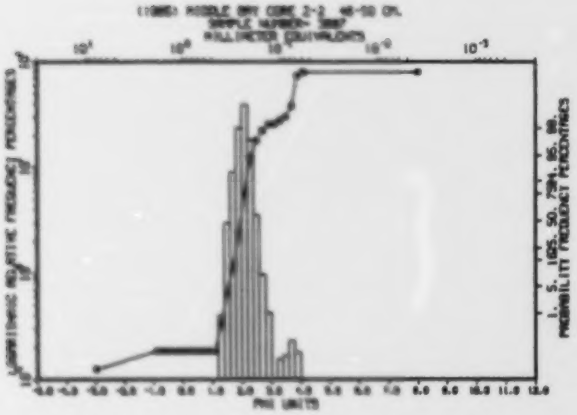
MIDDLE BAY CORE 2-2

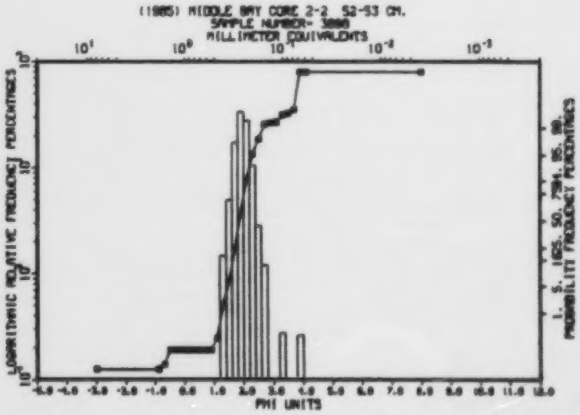






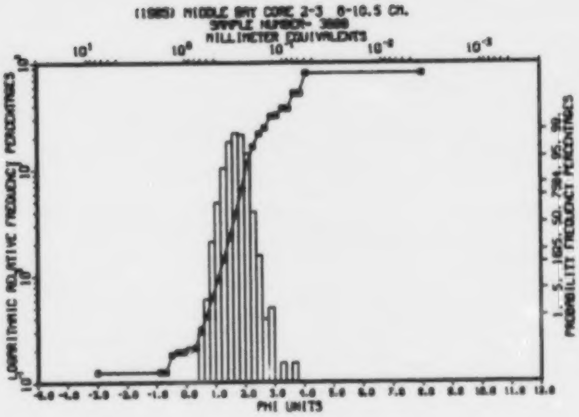


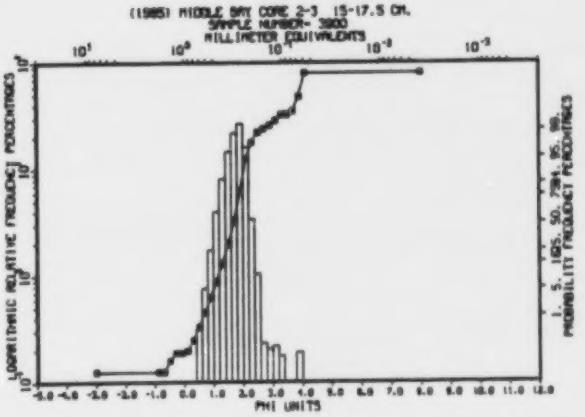


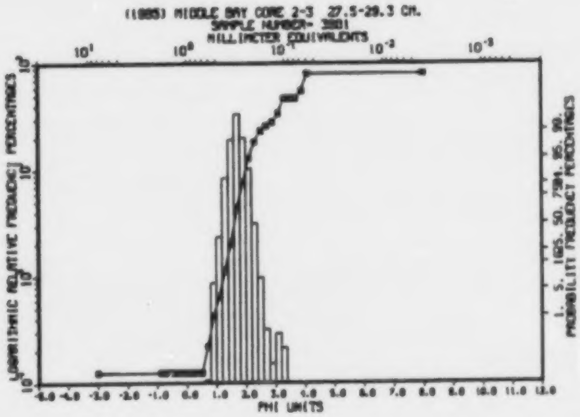


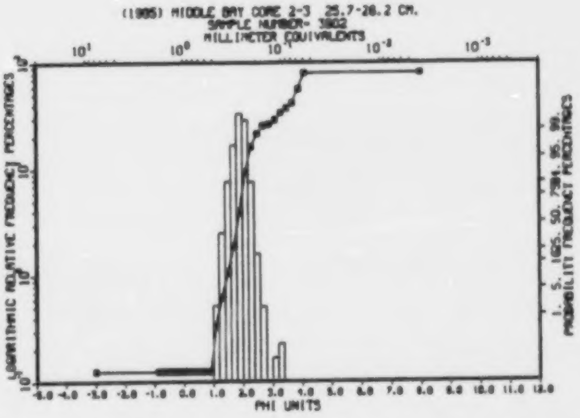
APPENDIX 2 (continued)

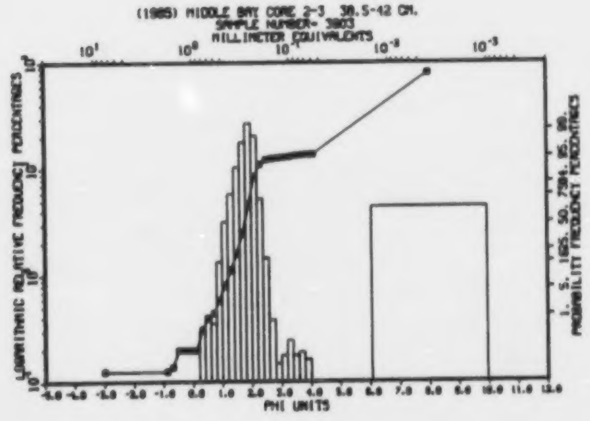
MIDDLE BAY CORE 2-3

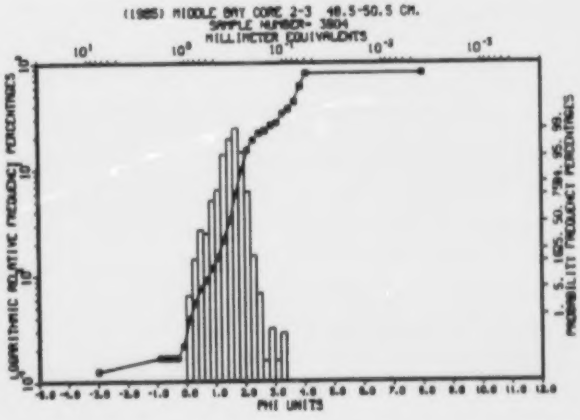






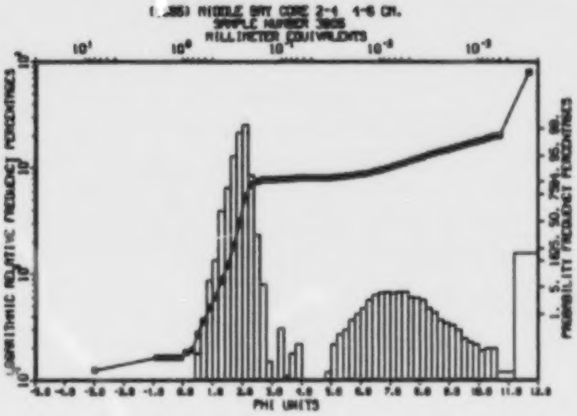


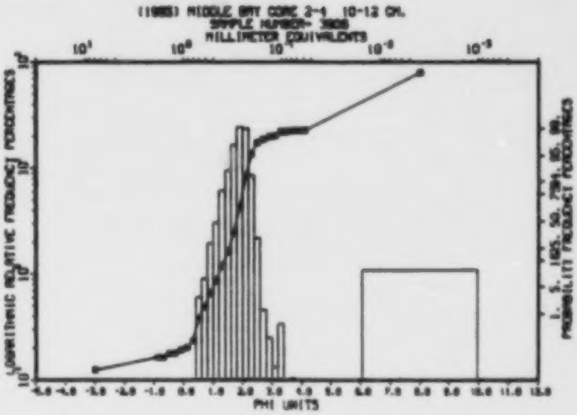


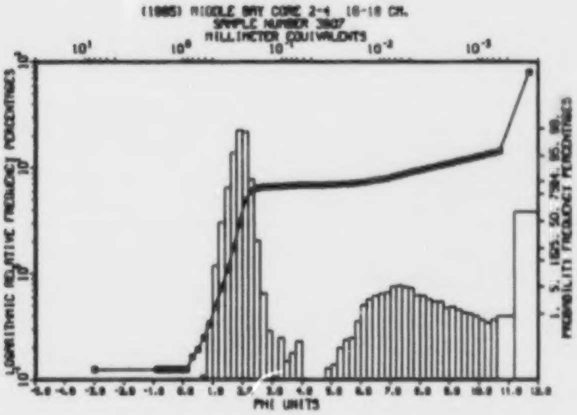


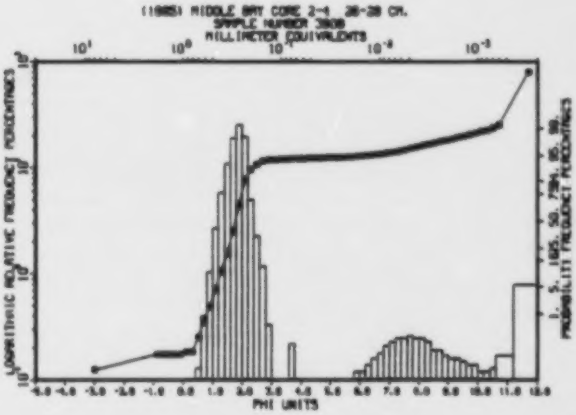
APPENDIX 2 (continued)

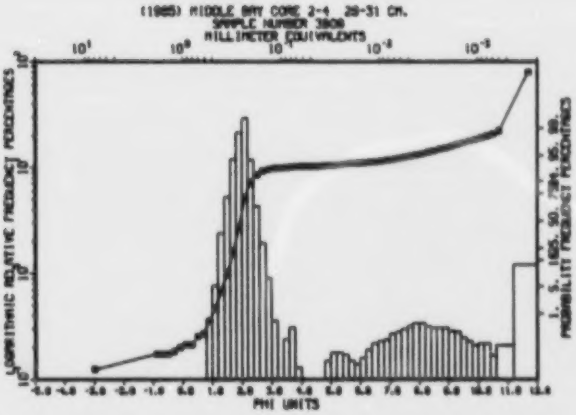
MIDDLE BAY CORE 2-4

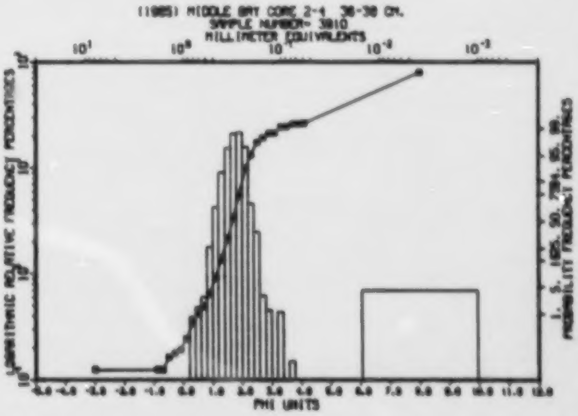






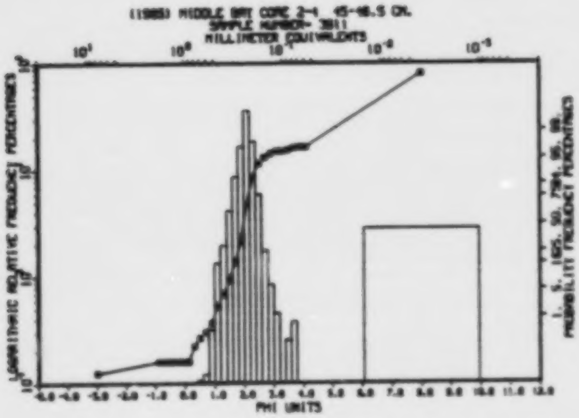


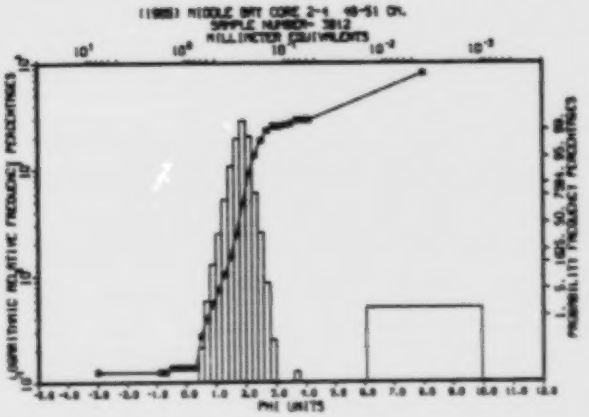




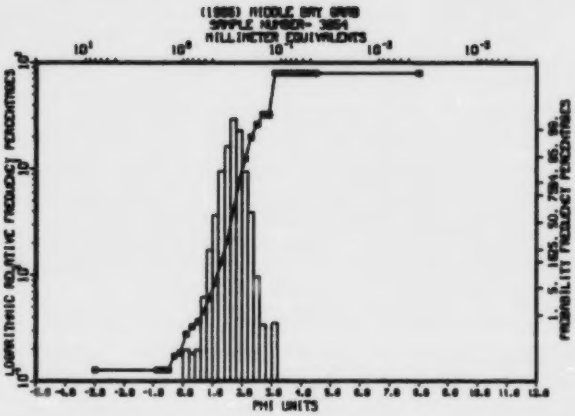
APPENDIX 2 (continued)

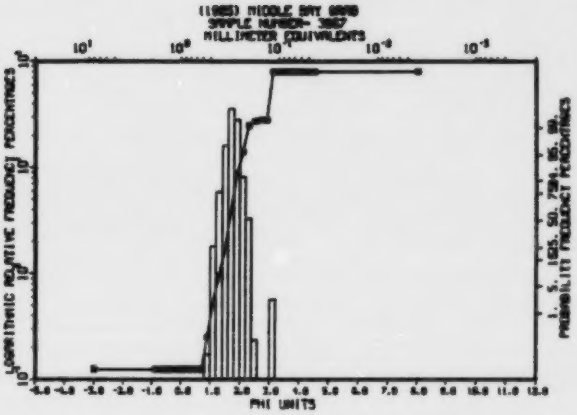
MIDDLE BAY CORE 2-4

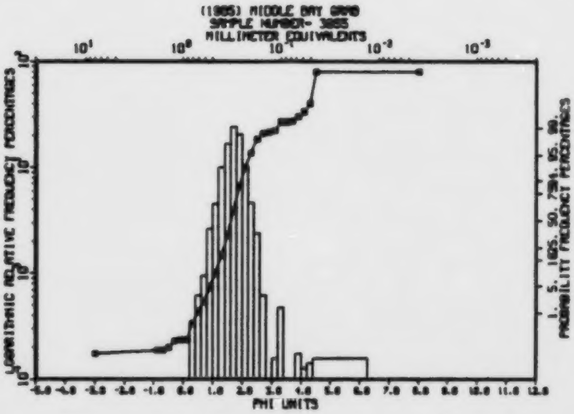


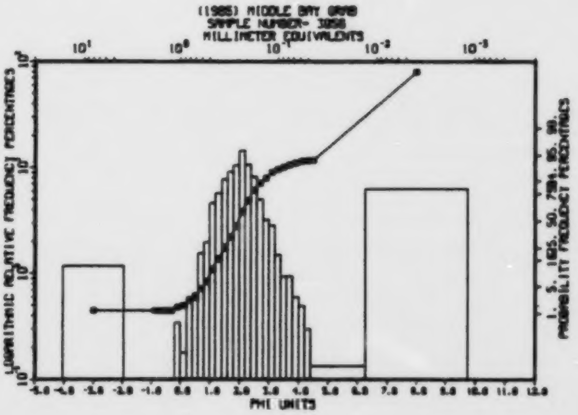


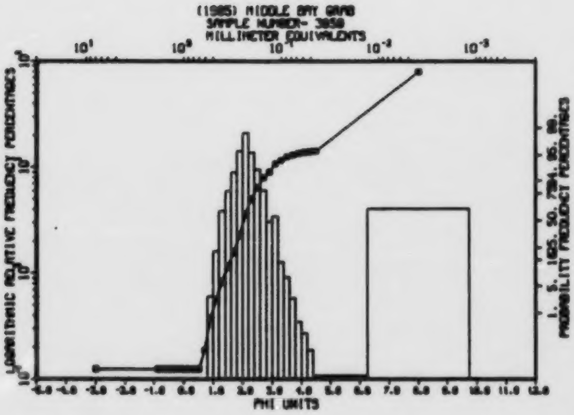
MIDDLE BAY GRABS





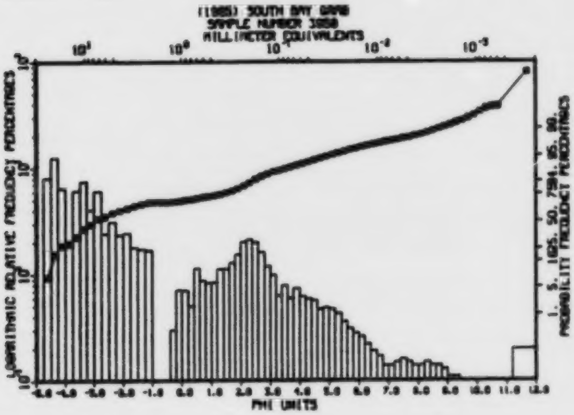




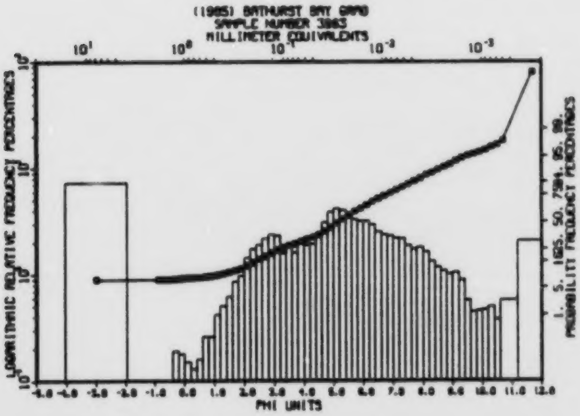


APPENDIX 2 (continued)

SOUTH BAY GRAB



BATHURST BAY GRAB

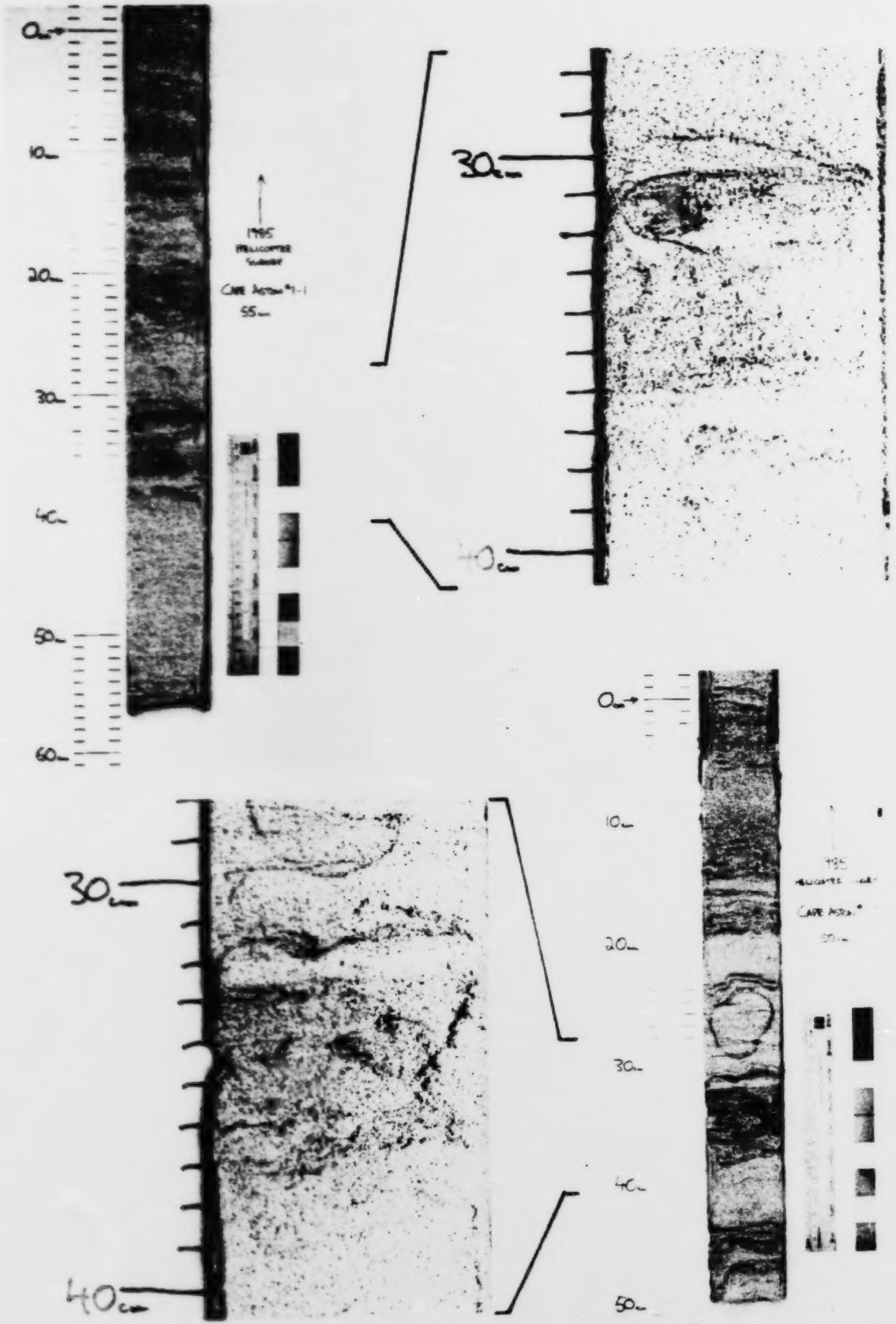


APPENDIX 2 (continued)

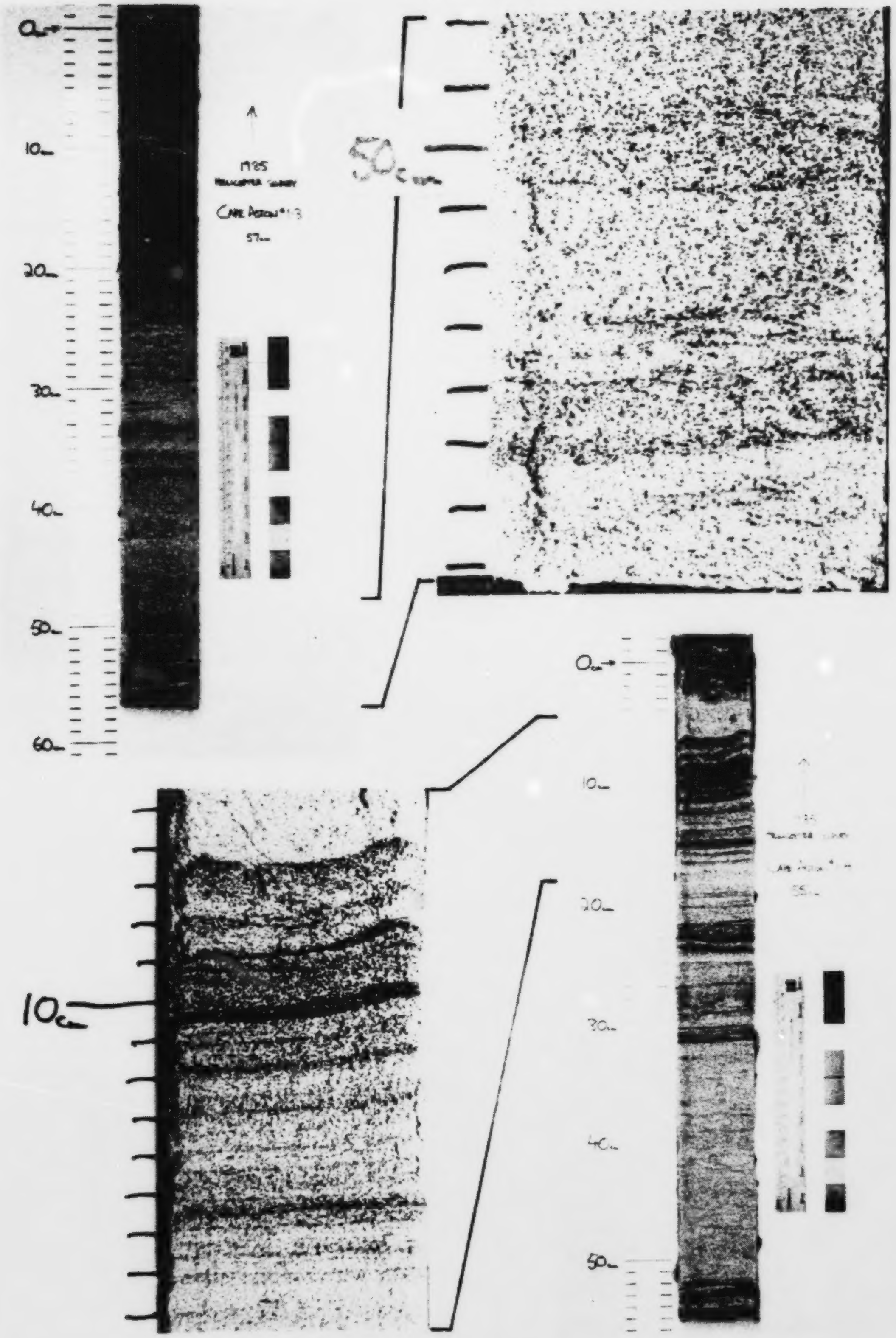
APPENDIX 3

Photographs of the epoxy resin penetration peels obtained from cores collected at (1) Cape Aston beach, (2) Cape Coutts beach, and (3) McBeth Fiord head delta. Core locations are listed in Table 2, and indicated in Figures 2, 4 and 6.

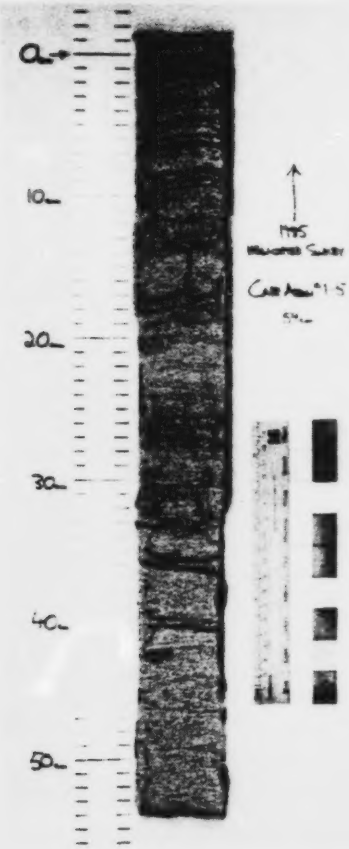
Note that (1) the 0 cm position indicated on the scale adjacent to the peels is the actual sediment surface, sediment above this line was added to minimize disturbance during transport, and (2) movement of epoxy down fractures in the sediment or along the core liner sometimes resulted in wavy ridges running across the peel surface, or in a disproportionate peel thickness at the core top or bottom.

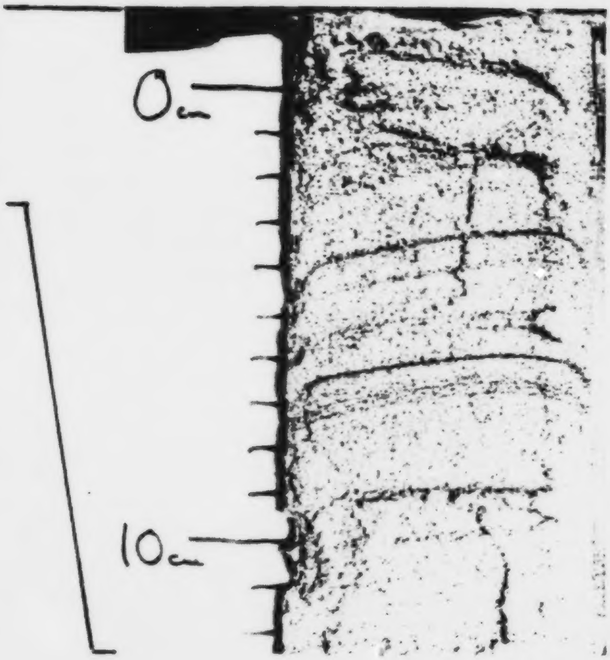

0cm
10cm
20cm
30cm
40cm
50cm
60cm
1985
HELICOPTER
SURVEY
CAPE ASTON #1-1
55cm
30cm
40cm
30cm
40cm
0cm
10cm
20cm
30cm
40cm
50cm
1985
HELICOPTER SURVEY
CAPE ASTON #
50cm

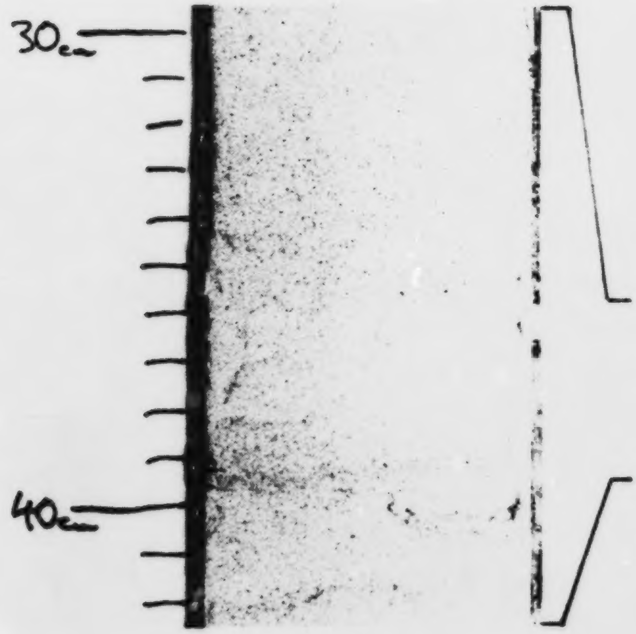
APPENDIX 3 (continued)

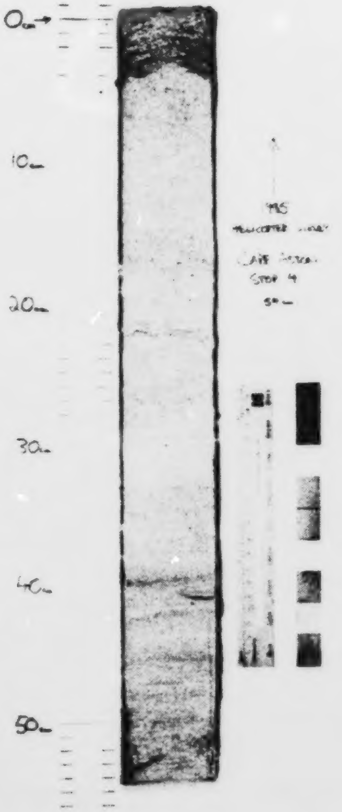

0cm
10cm
20cm
30cm
40cm
50cm
60cm
1985
57cm
50cm
0cm
10cm
20cm
30cm
40cm
50cm
10cm

APPENDIX 3 (continued)

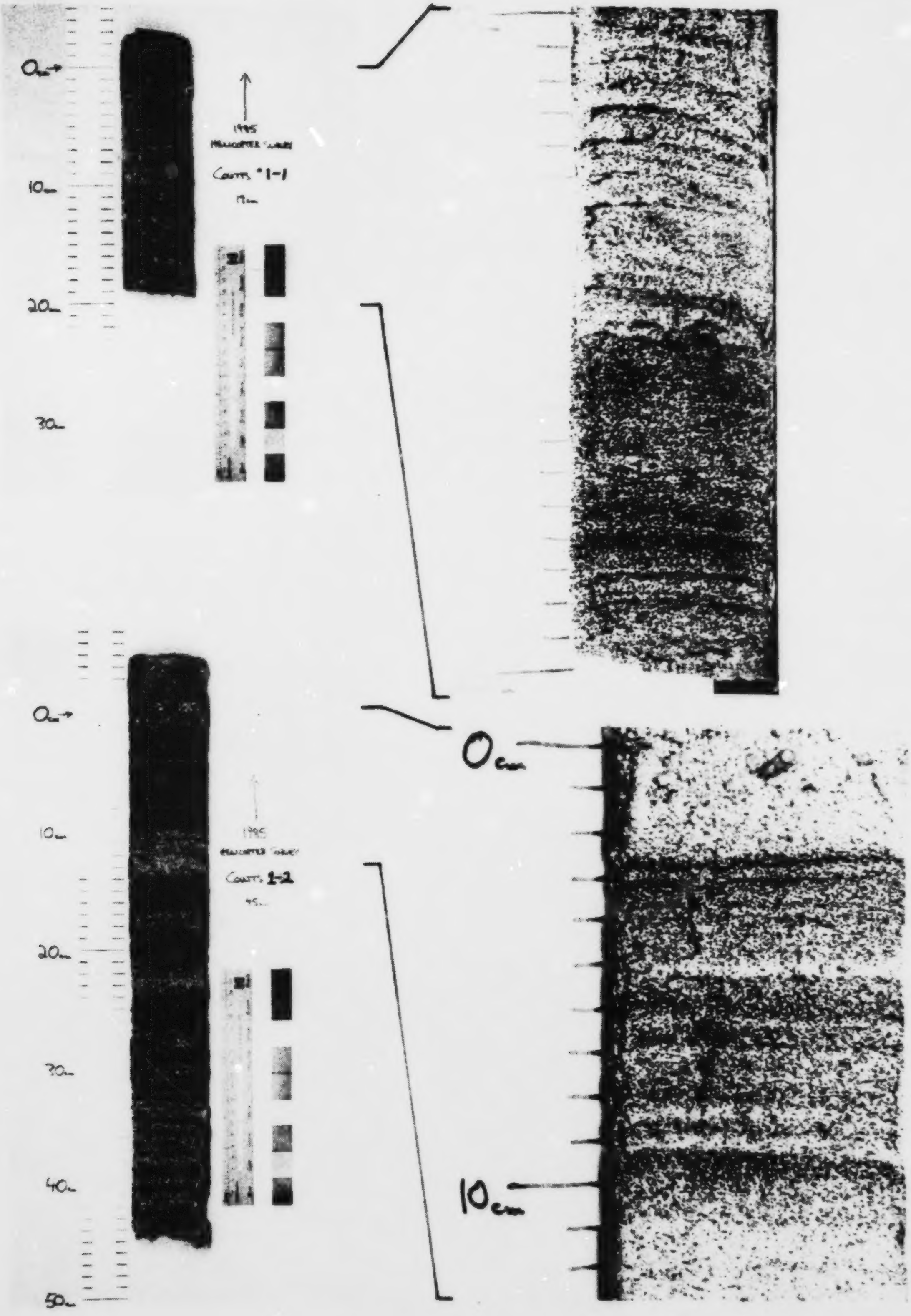

0cm
10cm
20cm
30cm
40cm
50cm
1995



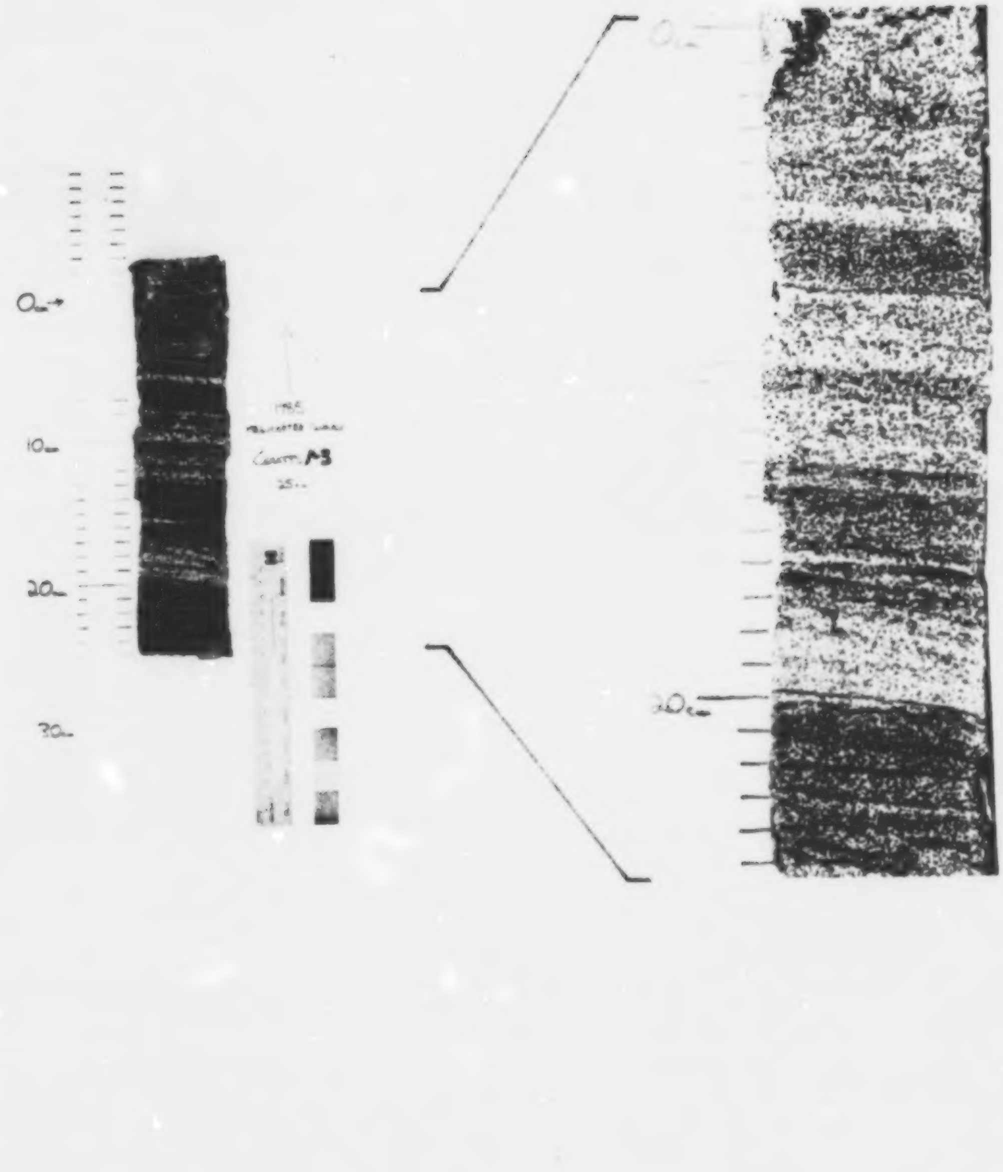



0cm
10cm
20cm
30cm
40cm
50cm
1995
Stop 4

APPENDIX 3 (continued)


0cm→
10cm
20cm
30cm
1995
Helicopter Survey
Coutts #1-1
19cm
0cm→
10cm
20cm
30cm
40cm
50cm
1995
Helicopter Survey
Coutts 1-2
45cm
0cm
10cm

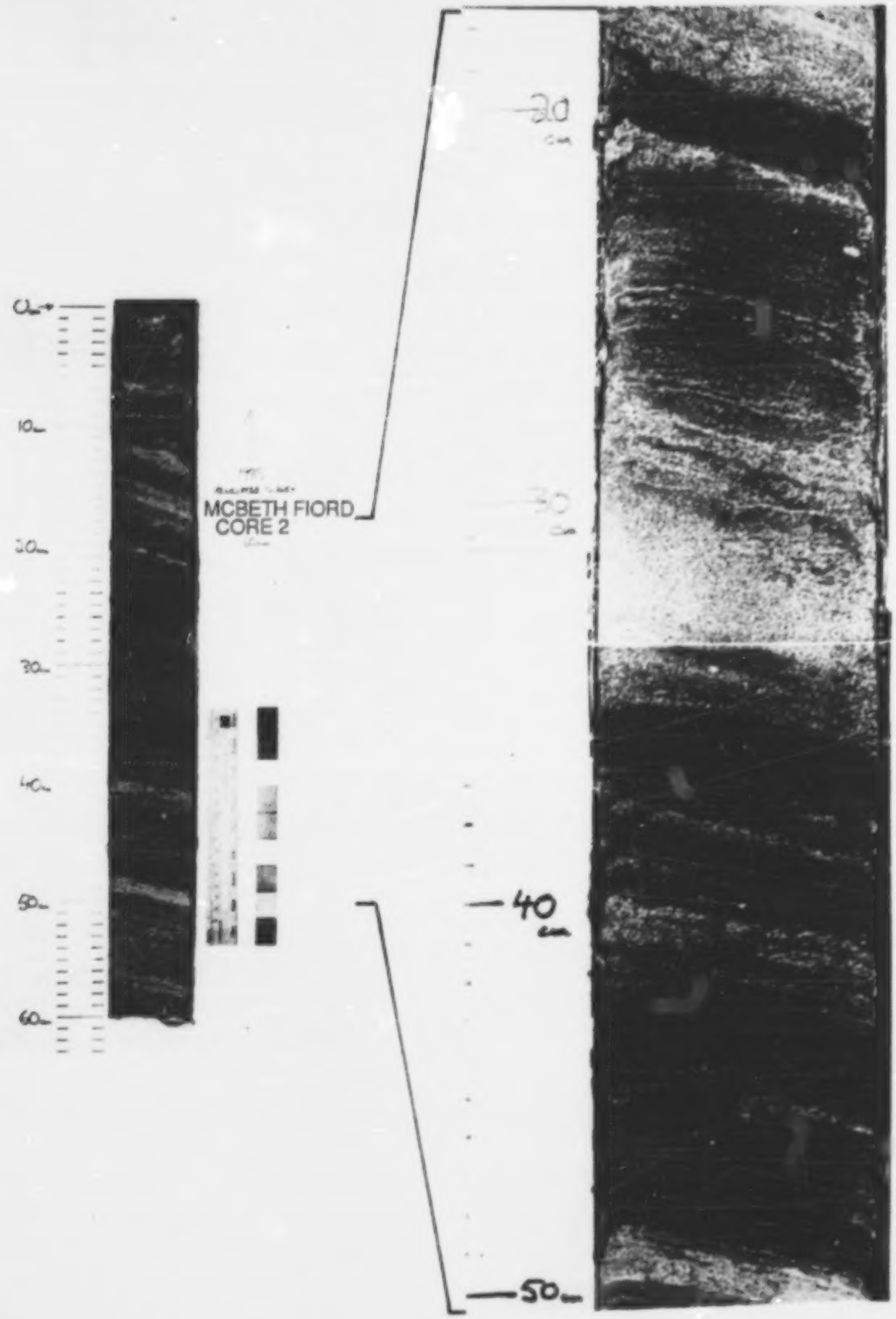
APPENDIX 3 (continued)


0cm→
10cm
20cm
30cm
1985
A3
25cm
0cm
20cm

APPENDIX 3 (continued)

0cm
10cm
20cm
60cm

1983
MCBETH FIORD
CORE 1


0cm
10cm
20cm
30cm
40cm
50cm
60cm
MCBETH FIORD
CORE 2
20 cm
30 cm
40 cm
50cm

APPENDIX 3 (continued)

CHAPTER 4

SUSPENDED SEDIMENT LOADS ALONG THE COAST OF NE BAFFIN AND BYLOT ISLANDS

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Bedford Institute of Oceanography
Box 1006, Dartmouth, N.S.
B2Y 4A2

Project Objectives:

(1) To obtain a general pattern of the flux of sediment from land to sea and evaluate how that flux is affected by glacial and snow meltwater, erosion of raised marine sediments, lake filtration, and marine flocculation.

(2) To obtain information on the size fractionation processes that occur during the efflux of sediment from land to sea.

Methods:

Sample locations are shown in Figures 1, 2 & 3, and listed in Table 1. Water samples were collected by hand-held 1-L Nalgene bottles from river banks or from platforms (PCSP helicopters, small boats) during BIO land-based expeditions in 1981, 1985 and 1986, and during BIO cruise 85-062. The samples were later filtered onto pre-weighed 47 mm diameter and 0.45 µm nominal pore diameter Nucleopore® filters. Distilled water was washed through the final filtration stage to ensure no salts precipitated onto the filter. Filters were oven dried at 40°C for 15 hours. The filters were then reweighed (± 0.005 mg) and the total suspended sediment concentration determined.

The 2800 series lab ID samples were analyzed on the Atlantic Geoscience Centre (AGC) computerized Coulter Counter model TAII® with two or three aperatures (30 µm, 200 µm, 280 µm) and subsequently overlapped. Sample 85272 was analyzed by K. Kranck on the Atlantic Oceanographic Laboratory computerized Coulter Counter model TAII® with three aperatures (200 µm, 560 and 1200 µm) and subsequently overlapped. The filters were initially sonified in a sodium hexametaphosphate solution to provide a suitable electrolyte solution for particle analysis. The results are in terms of nominal equivalent spherical diameters and at 1/3 Ø intervals.

The 3500 series lab ID samples were analyzed according to normal AGC soft sediment laboratory procedures. If the sand fraction was greater than 10 %, then that fraction was analyzed for its equivalent spherical sedimentation diameters using the computerized AGC settling tube. The mud fraction was analyzed on a computerized Sedigraph® 5000D for particle equivalent spherical sedimentation diameters at 1/5 Ø intervals.

Moment statistics and frequency plots describing each size frequency distribution were calculated using the program READY (Hackett et al., 1986).

Results:

The suspended sediment concentrations and associated size information are listed in Table 1. Size frequency distribution plots are subsequently displayed, in the same order that the samples appear listed in Table 1. The frequency distributions are plotted in two ways, as histograms on a logarithmic frequency axis, and as cumulative curves on a probability frequency axis.

Future research will attempt to work out suspended load rating estimates from this data set. One initial observation is that SPM concentration values for these arctic glacier-fed rivers are comparable to temperate rivers having an annual discharge an order-of-magnitude larger. However, local effects are very important in explaining the variations in the concentration of suspended sediment. For example, the McBeth River, cut into raised deltaic/lagoonal sediment, had low values for SPM (10.6 g m^{-3}), but a local side-entry glacial outwash fan increased these loading values by an order-of-magnitude. It is noteworthy that the SPM levels observed along the front of the Coronation Glacier have over an order-of-magnitude variation (Fig. 3).

Acknowledgements:

Donald Clattenburg and Bill LeBlanc performed the textural analyses. Dan Praeg prepared the figures.

Reference:

Hackett, D.W., Syvitski, J.P.M., Prime, W. and Sherin, A.G.
1986: Sediment size analysis system user guide. Geological Survey of Canada, Open File Report #1240, 25 p.

Table 1.

Lab ID	System	Conc. (g m^{-3})	Mean (Ø)	St. D. (Ø)	Skew.	Kurt.	Sand (%)	Silt (%)	Clay (%)	Date
2809	Clyde R. -near the river mouth at the head of the fjord -69° 50.2' N 70° 30' W (Fig. 1)	2.7	7.6	1.7	-0.3	2.3	1.4	57.2	41.3	19:41 06/08/85
2822	McBeth R. -landward of Neoglacial outwash fan -69° 30.8' N 70° 10' W (Fig. 1)	10.6	7.0	1.5	0.4	2.3	0.2	73.9	25.9	17:50 06/08/85
2828	McBeth R. -seaward of Neoglacial outwash fan -69° 31.2 N 70° 04' W (Fig. 1)	136.4	7.6	1.7	-0.6	3.2	3.8	54.1	42.0	17:57 06/08/85
2813	Inugsuin R. -seaward of the lakes -69° 37.9' N 70° 02' W (Fig. 1)	1.3	6.8	1.7	0.5	2.1	0.3	73.7	26.0	10:51 06/08/85
2837	Itirbilung R. - river mouth -69° 15.1' N 69° 17' W (Fig. 1)	152.9	6.9	1.8	-0.1	2.2	5.5	63.7	30.8	18:32 05/08/85
2826	Pass R. -glacial stream in major mountain pass between Itirbilung and McBeth fjords -69° 23.1 N 68° 40' W (Fig. 1)	152.1	6.2	2.0	0.4	2.1	12.8	65.0	22.2	18:55 05/08/85
2835	Itirbilung G. -second glacier stream on north wall from head of the fjord -69° 19.2' N 69° 10' W (Fig. 1)	88.6	6.6	1.9	0.1	2.1	9.0	65.9	25.2	18:41 05/08/86
3559	Clyde Ck. -creek through Clyde Village by weather station -70° 28.9' N 68° 35' W (Fig. 1)	2204.0	5.7	3.0	0.7	2.3	41.8	34.6	23.6	09:50 05/08/85
2823	Clyde N. -creek between nivation hollows #2 and #3 near Clyde Village -70° 25.9' N 68° 41' W (Fig. 1)	23.2	7.3	1.7	0.2	1.8	0.2	64.0	35.8	10:20 05/08/86
85272	Clyde N. -at nivation hollow #2 from subice drainage -70° 25.9' N 68° 41' W (Fig. 1)	386.2	4.8	2.4	1.1	3.2	50.4	36.0	13.6	10:30 05/08/85
2808	N. Paquet Bay -at the river mouth of the south river -71° 49.2' N 77° 37' W (Fig. 1)	6.5	6.9	2.3	-0.1	1.6	11.7	48.2	40.0	18:49 10/08/85
2817	N. Paquet Bay -at the river mouth of the north river -71° 49.8' N 77° 38' W (Fig. 1)	1.1	7.1	1.9	0.2	1.8	1.6	64.6	33.8	18:48 10/08/85

Table 1. (cont.)

Lab ID	System	Conc. (g m^{-3})	Mean (Ø)	St. D. (Ø)	Skew.	Kurt.	Sand (%)	Silt (%)	Clay (%)	Date
2811	Keel R.	0.8	7.5	1.7	-0.1	2.0	0.3	58.4	41.3	15:57 10/08/85
-at the river mouth flowing into the head of Cambridge Fiord -71° 12.5' N 75° 08' W (Fig. 1)										
3561	Erik Harb.	362.1	8.1	2.3	0.2	1.9	0.8	51.5	47.7	19:30 12/08/85
-sample #1 collected from mouth of river flowing into Erik Lakes -72° 22.7' N 76° 24' W (Fig. 2)										
2838	Erik Harb.	170.6	8.6	1.4	-1.5	6.4	1.7	24.0	74.2	19:35 12/08/85
-sample #2 from the surface waters of the middle of the most landward of Erik Lakes T=2.5°C, S=0°/oo, 40 m above sea level -72° 24.7' N 76° 21' W (Fig. 2)										
3562	Erik Harb.	276.1	10.6	1.7	-2.2	8.5	0.6	3.7	95.8	19:40 12/08/85
-sample #3 from the surface waters of the ice-proximal side-entry moraine-dammed lake T=2.0°C, S=0°/oo, 40 m above sea level -72° 27.2' N 76° 16' W (Fig. 2)										
2829	Erik Harb.	136.4	8.2	1.8	-1.2	3.8	5.1	29.1	65.8	19:45 12/08/85
-sample #4 from the surface waters of the middle of the most seaward of Erik Lakes T=2.5°C, S=0°/oo, 19 m above sea level -72° 28.0' N 76° 11' W (Fig. 2)										
2804	Erik Harbour	8.8	8.1	1.5	-0.6	2.7	0.2	41.9	57.9	19:50 12/08/85
-sample #4 from the surface waters of Erik Harbour near the main tidewater glacier T=3.0°C, S=32°/oo, at sea level -72° 28.2' N 76° 07' W (Fig. 2)										
3564	Erik Harb.	1841.0	2.2	1.8	2.9	9.9	92.0	4.0	4.0	15/08/81
-at mouth of river draining the Erik Harbour Lakes and flowing into Erik Harbour: sample #9 (local ID) -72° 29.2' N 76° 07' W (Fig. 2)										
2810	Erik Harbour	4.7	8.0	1.5	-0.6	2.7	0.2	44.1	55.7	15/08/81
-sample #10 from surface waters or Erik Harbour seaward sample #9 -72° 29.3' N 76° 04' W (Fig. 2)										
2839	Erik Harb.	125.9	8.6	1.6	-1.6	5.7	2.6	20.9	76.4	15/08/81
-at mouth of side-entry river flowing into the harbour from along the NW wall: sample #11 (local ID) -72° 32.9' N 76° 10' W (Fig. 2)										
2815	Erik Harbour	6.7	7.8	1.7	-0.5	2.4	0.5	47.6	51.8	15/08/81
-sample #12 from the surface waters of Erik Harbour directly seaward of sample #11 -72° 32.8' N 76° 07' W (Fig. 2)										
2814	Erik Harbour	3.8	7.6	1.5	-0.2	2.3	0.5	57.3	42.2	15/08/81
-sample #13 surface water collected seaward of sample #12 -72° 33.7' N 76° 06' W (Fig. 2)										

Table 1. (cont.)

Lab ID	System	Conc. (g m^{-3})	Mean (Ø)	St. D. (Ø)	Skew.	Kurt.	Sand (%)	Silt (%)	Clay (%)	Date
2812	Erik Harbour -sample #14 surface waters collected seaward of sample #13 -72° 34.8' N 76° 03' W (Fig. 2)	4.2	6.9	2.2	-0.1	1.6	9.0	50.6	40.4	15/08/81
3563	Oliver Sound -at mouth of river draining main trunk glacier: sample #2 (local ID) -72° 07.7' N 76° 59' W (Fig. 2)	482.9	9.8	2.2	-0.9	2.8	2.4	20.4	77.2	13/08/81
2833	Oliver Sound -sample #1 surface waters collected seaward of sample #2 -72° 08.4' N 77° 01' W (Fig. 2)	44.6	8.8	1.2	-1.5	6.4	1.0	21.6	77.4	13/08/81
2807	Oliver Sound -sample #3 surface waters collected seaward of sample #1 -72° 09.0' N 77° 03' W (Fig. 2)	1.2	6.0	2.2	0.4	1.8	22.6	53.4	24.0	13/08/81
2824	Oliver Sound -sample #4 surface water collected seaward of sample #3 -72° 09.9' N 77° 08' W (Fig. 2)	3.4	7.7	1.5	-0.2	2.2	0.2	53.8	46.0	13/08/81
2818	Oliver Sound -sample #5 surface water collected seaward of sample #4 -72° 11.1' N 77° 14' W (Fig. 2)	4.7	7.7	1.4	-0.2	2.6	0.7	55.8	43.5	13/08/81
2819	Oliver Sound -sample #6 surface water collected seaward of sample #5 -72° 11.5' N 77° 23' W (Fig. 2)	??	6.4	1.4	0.7	3.0	0.3	84.9	14.8	13/08/81
2821	Oliver Sound -sample #7 surface water collected seaward of sample #6 -72° 12.8' N 77° 38' W (Fig. 2)	1.7	7.2	1.5	0.1	2.1	0.3	67.2	32.5	13/08/81
2820	Oliver Sound -sample #8 surface water collected seaward of sample #7 -72° 15.8' N 77° 51' W (Fig. 2)	2.2	7.3	1.6	0.2	2.0	0.2	65.1	34.7	13/08/81
2816	Cape Adair -at river mouth -71° 32.3' N 71° 52' W (Fig. 1)	6.0	7.4	2.4	-0.4	1.7	11.7	37.9	50.5	07/08/85
2806	Salmon R. -near river mouth -72° 40.5' N 78° 05' W (Fig. 2)	55.8	8.4	1.7	-0.8	2.6	0.5	33.9	65.6	12:55 09/08/85
2836	C. Liverpool -sample #1 taken near icefront of inland glacier, Bylot Island -73° 31.8' N 78° 22' W (Fig. 2)	208.4	6.0	1.8	0.5	2.6	11.3	72.8	15.9	12:51 15/08/85

Table 1. (cont.)

Lab ID	System	Conc. (g m^{-3})	Mean (Ø)	St. D. (Ø)	Skew.	Kurt.	Sand (%)	Silt (%)	Clay (%)	Date
2825	C. Liverpool	155.4	6.6	2.2	0.0	1.9	14.4	54.8	30.8	13:30 15/08/85
-sample #2 taken near icefront of a second inland glacier, Bylot Island -73° 31.8' N 78° 26' W (Fig. 2)										
3565	C. Liverpool	314.0	9.6	2.1	-0.6	2.6	1.2	23.3	75.5	13:50 15/08/85
-sample taken at the mouth of the river entering the sea, Bylot Island -73° 39.1' N 78° 38' W (Fig. 2)										
2827	Guys Bight	70.4	8.0	1.9	-1.0	3.1	5.4	34.6	60.0	11:43 16/08/85
-at river mouth -72° 38.2' N 76° 41' W (Fig. 2)										
3560	S. Barrier	439.6	7.1	1.8	0.4	2.6	0.4	68.1	37.3	10:35 11/08/85
-at the ice front stream of the main trunk glacier on the South Barrier of Bylot Island -72° 58.4' N 76° 36' W (Fig. 2)										
2834	S. Barrier	183.2	7.5	1.4	-0.5	3.7	2.4	60.3	37.3	10:55 11/08/85
-at the ice front stream of a secondary glacier on the South Barrier of Bylot Island -72° 58.7' N 76° 38' W (Fig. 2)										
2805	Bathurst Bay	293.8	7.4	1.6	0.1	2.0	0.4	62.0	37.6	31/07/81
-at the ice front, Bylot Island -73° 19.3' N 77° 20' W (Fig. 2)										
2830	Bathurst Bay	195.3	7.0	1.8	-0.3	2.4	6.2	60.4	33.4	15:45 11/08/85
-at the ice front, Bylot Island -73° 18.8' N 77° 22' W (Fig. 2)										
2831	M. Barrier	10.5	7.4	1.6	-0.6	3.0	3.3	56.4	40.2	12:13 11/08/85
-at the ice margin of the main trunk glacier in the middle barrier of Bylot Island -73° 09.3' N 76° 50' W (Fig. 2)										
2832	C. MacCulloch	84.1	7.8	1.7	-0.7	3.1	3.0	45.5	51.5	10:10 10/08/85
-at the river mouth -72° 28.7' N 75° 12' W (Fig. 2)										
3558	Coronation F.	22.0	8.2	1.5	-0.9	4.2	2.3	40.0	57.7	11:30 07/09/85
-sample PA85-062 CO-W1 sampled from the surface (marine) waters off the tidewater glacier (see Fig. 3)										
3553	Coronation F.	12.9	8.1	1.9	-1.0	3.3	5.0	34.1	60.9	11:35 07/09/85
-sample PA85-062 CO-W2 sampled from the surface (marine) waters off the tidewater glacier (see Fig. 3)										
3547	Coronation F.	2.1	7.5	1.8	0.0	1.7	0.0	57.7	42.3	11:40 07/09/85
-sample PA85-062 CO-W3 sampled from the surface (marine) waters off the tidewater glacier (see Fig. 3)										
3554	Coronation F.	130.6	6.8	2.0	0.0	2.0	7.9	60.0	32.1	11:45 07/09/85
-sample PA85-062 CO-W4 sampled from the upwelling tan waters off the tidewater glacier (see Fig. 3)										

Table 1. (cont.)

Lab ID	System	Conc. (g m^{-3})	Mean (Ø)	St. D. (Ø)	Skew.	Kurt.	Sand (%)	Silt (%)	Clay (%)	Date
3548	Coronation F.	6.8	6.4	1.8	0.8	2.5	1.0	77.5	21.6	11:50 07/09/85
-sample PA85-062 CO-W5 sampled from the surface (marine) waters off the tidewater glacier (see Fig. 3)										
3549	Coronation F.	4.5	7.4	1.9	-0.2	1.8	2.2	54.6	43.2	11:55 07/09/85
-sample PA85-062 CO-W6 sampled from the surface (marine) waters off the tidewater glacier (see Fig. 3)										
3555	Coronation F.	28.2	8.7	1.4	-1.7	6.4	1.9	19.3	78.8	11:58 07/09/85
-sample PA85-062 CO-W7 sampled from the surface (marine) waters off the tidewater glacier (see Fig. 3)										
3556	Coronation F.	9.8	7.8	1.7	-1.0	3.7	5.2	42.1	52.7	12:00 07/09/85
-sample PA85-062 CO-W8 sampled from the surface (marine) waters off the tidewater glacier lagoon (see Fig. 3)										
3557	Coronation F.	7.3	7.6	2.0	-0.7	2.3	6.4	38.5	55.1	12:03 07/09/85
-sample 85-062 CO-W9 sampled from the surface (marine) waters off the tidewater glacier lagoon (see Fig. 3)										
3552	Itirbilung F.	0.72	7.2	1.8	0.3	1.8	0.1	66.4	33.4	13:12 14/09/85
-collected 10 m below the surface by Niskin water bottle with CTD and floc camera cast (PA85-062-22) -69° 19.4'N 68° 46.3' W (Fig. 1)										
3551	Itirbilung F.	0.65	6.7	1.8	0.7	2.3	0.5	75.3	24.2	13:12 14/09/85
-as in 3552 but at 120 m below the surface (PA85-062-22)										
3550	Itirbilung F.	1.31	7.4	1.8	-0.2	1.8	1.2	55.8	43.1	13:12 14/09/85
-as in 3552 but at 400 m below the surface (PA85-062-22)										

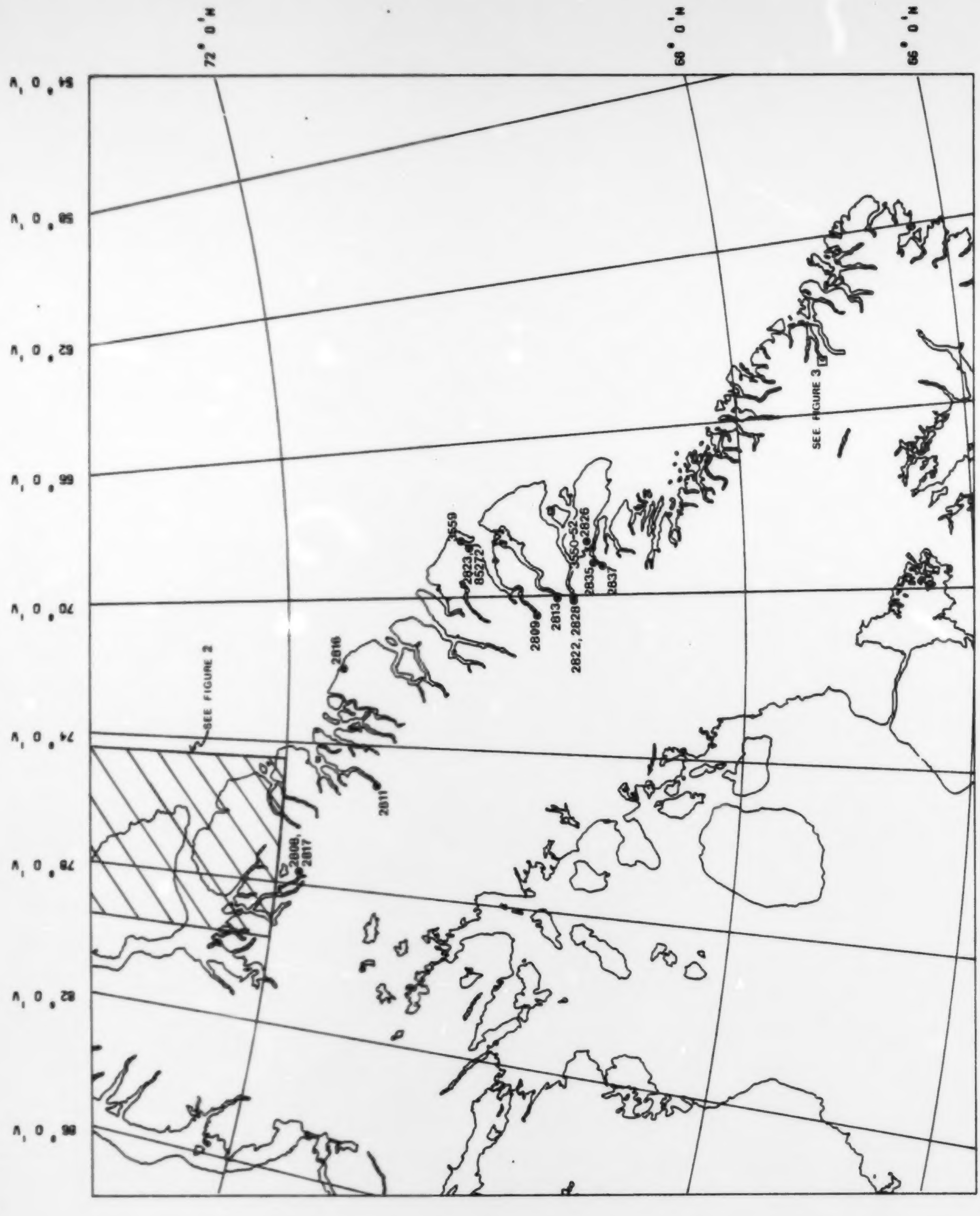
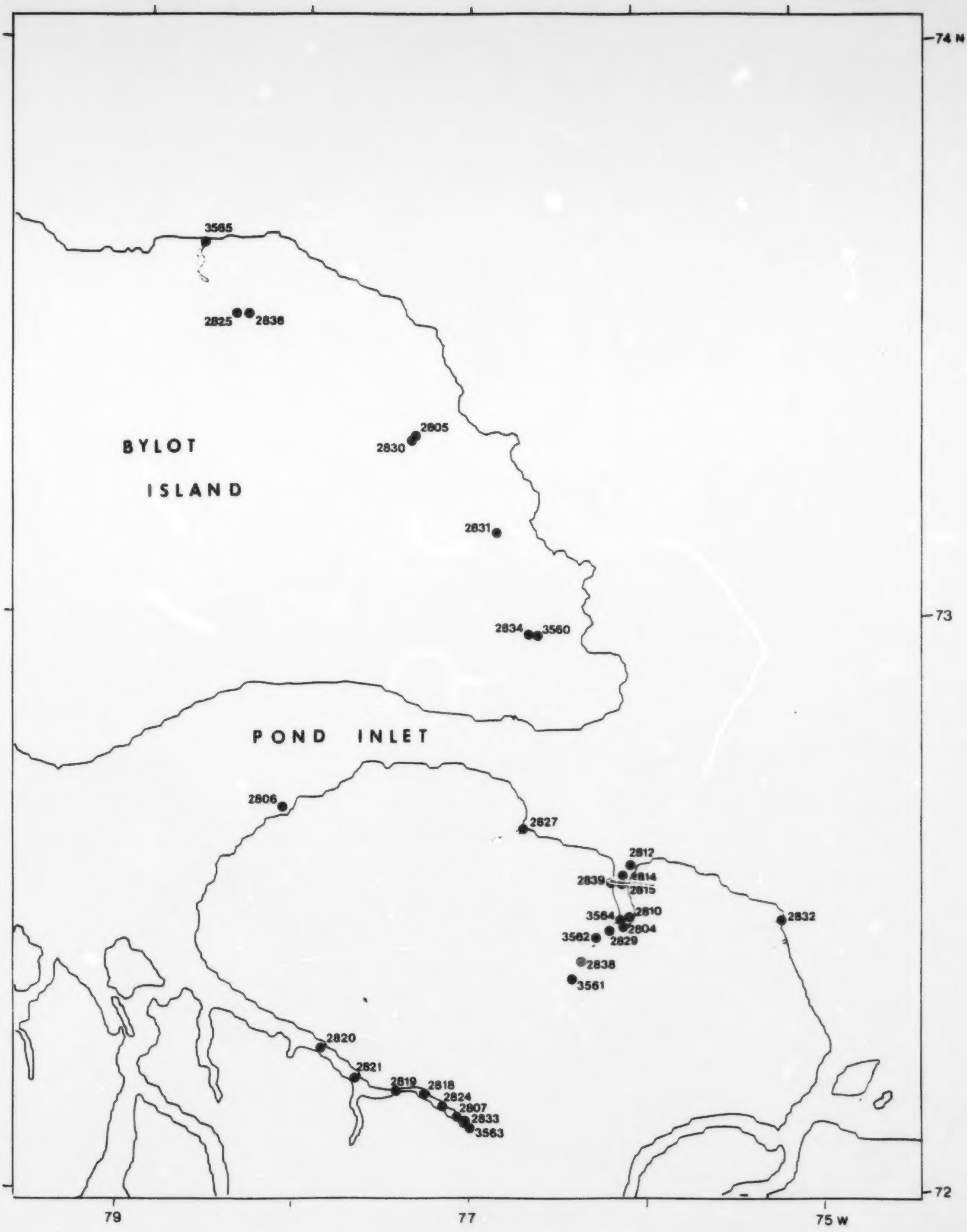
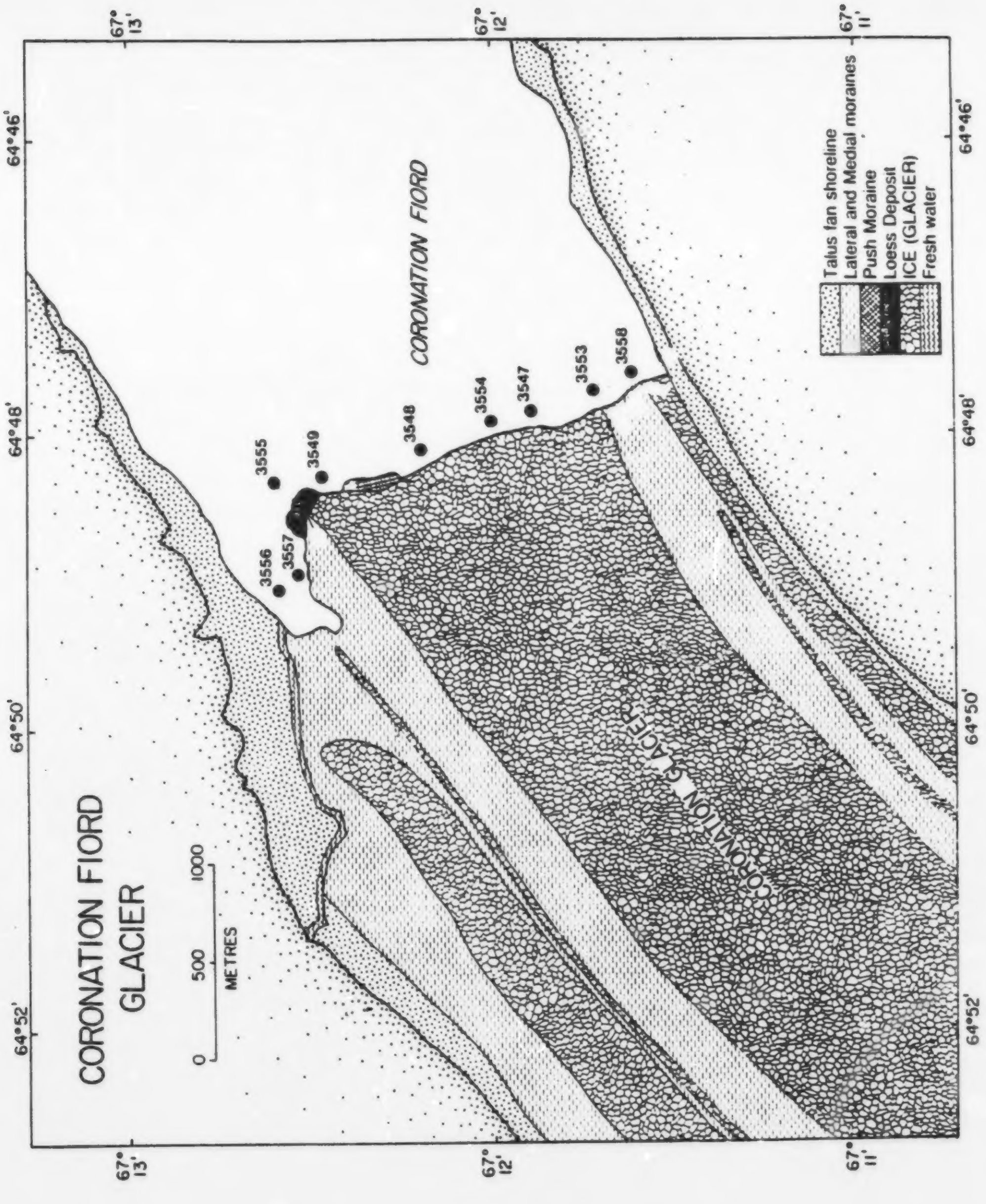

72°0'N
68°0'N
66°0'N
54°0'W
58°0'W
62°0'W
66°0'W
70°0'W
74°0'W
78°0'W
82°0'W
86°0'W
SEE FIGURE 2
SEE FIGURE 3
559
2823
85272
550-52
2826
2835
2837
2809
2813
2822, 2828
2816
2811
2808,
2817

FIGURE 1 - Locations of water samples along northeast Baffin and Bylot Islands.
See Table 1.



74 N
73
72
79
77
75 W
BYLOT
ISLAND
POND INLET
3565
2825
2836
2805
2830
2831
2834
3560
2806
2827
2812
2814
2839
2815
3564
2810
2804
3562
2829
2832
2838
3561
2820
2821
2819
2818
2824
2807
2833
3563

FIGURE 2 - Locations of water samples on northern Baffin and Bylot Islands (see Figure 1 for location). See Table 1.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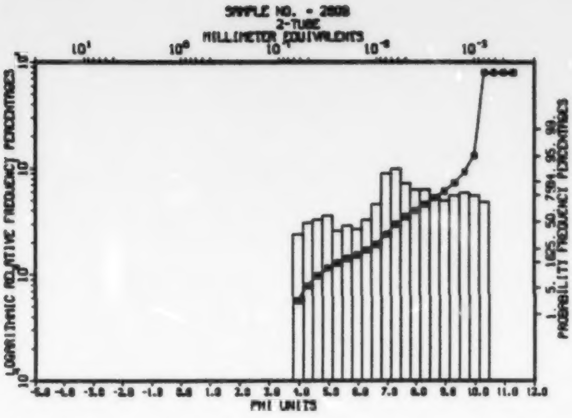
GLACIER
0
500
1000
METRES
CORONATION FIORD
CORONATION GLACIER
3556
3557
3555
3549
3548
3554
3547
3553
3558
Talus fan shoreline
Lateral and Medial moraines
Push Moraine
Loess Deposit
ICE (GLACIER)
Fresh water
64°52'
64°50'
64°48'
64°46'
67° 13'
67° 12'
67° 11'

FIGURE 3 - Locations of water samples along the front of Coronation Glacier (see Figure 1 for location). See Table 1.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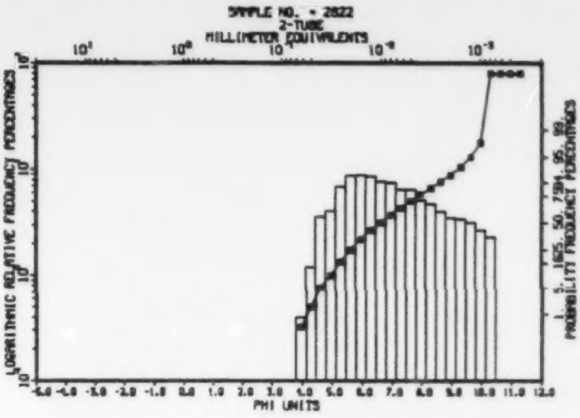
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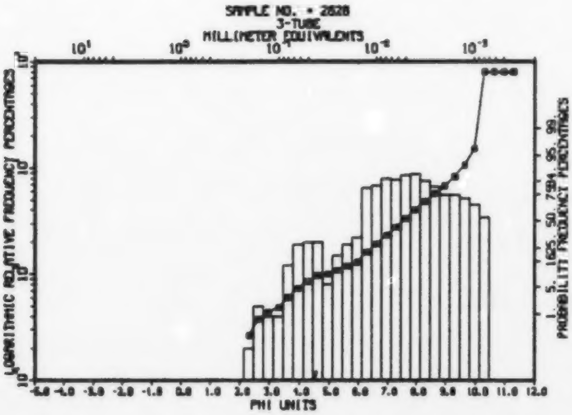
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PROBABILITY FREQUENCY PERCENTAGES
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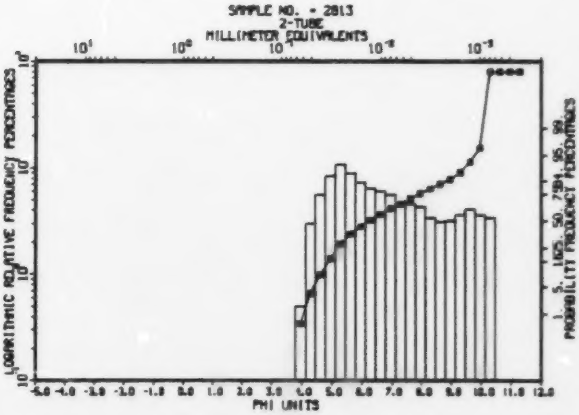
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PROBABILITY FREQUENCY PERCENTAGES
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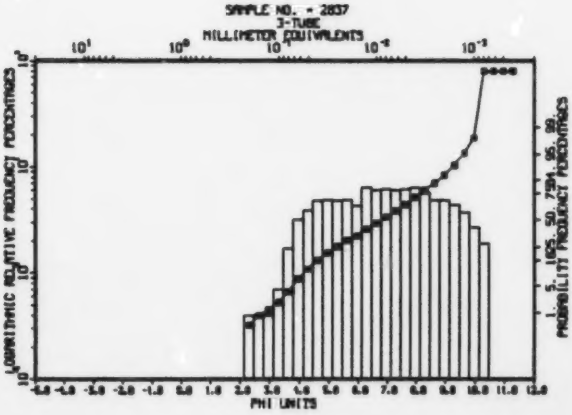
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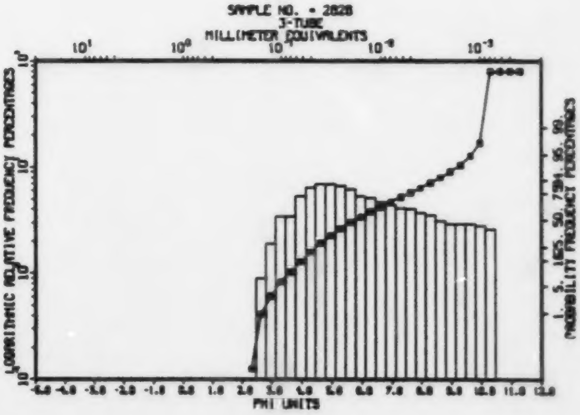
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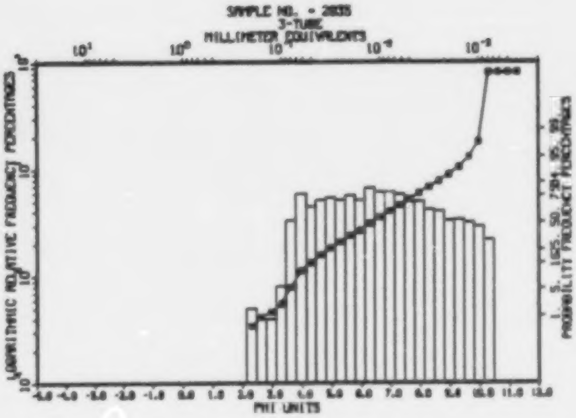
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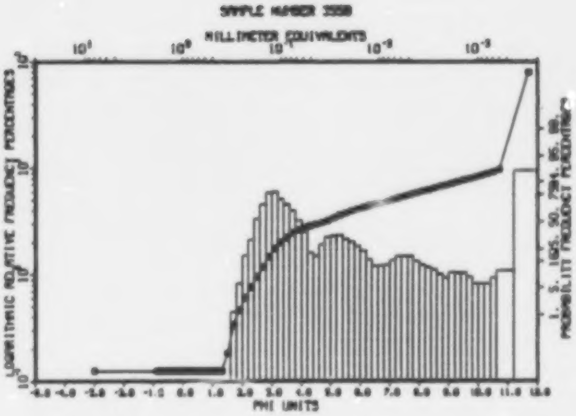
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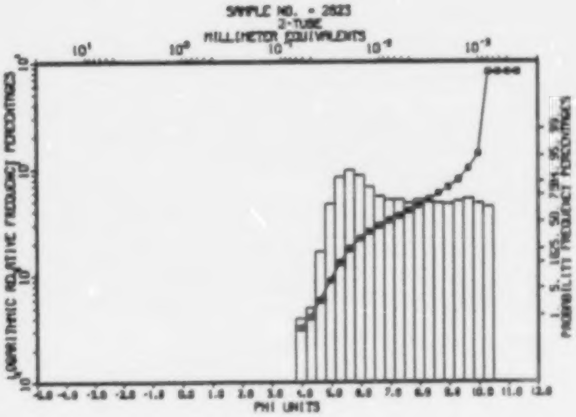
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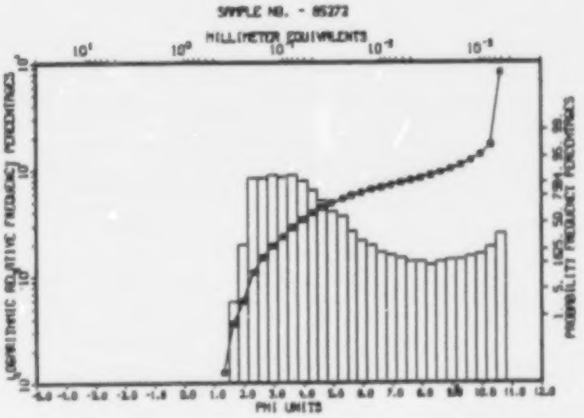
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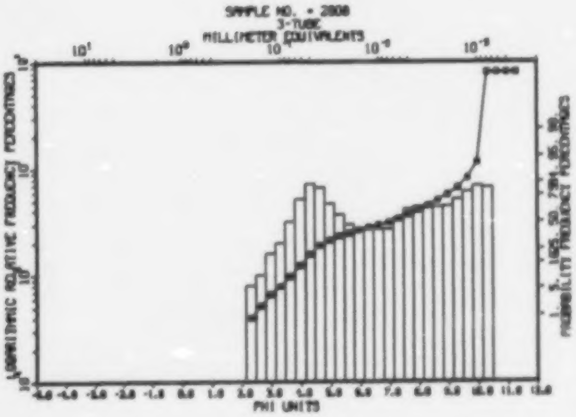
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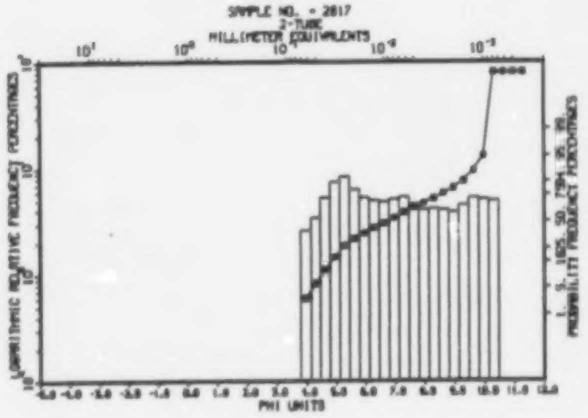
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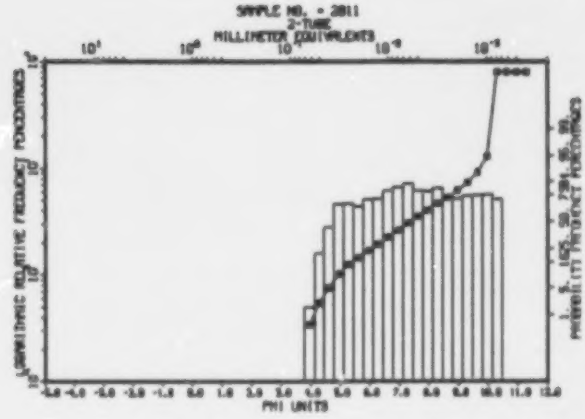
PHI UNITS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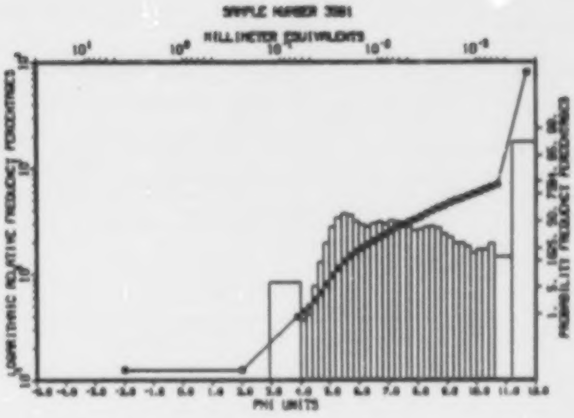
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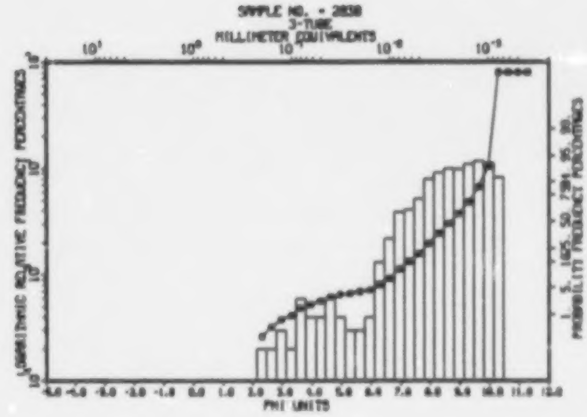
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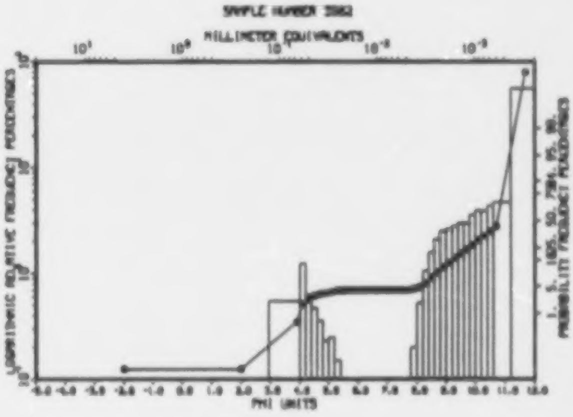
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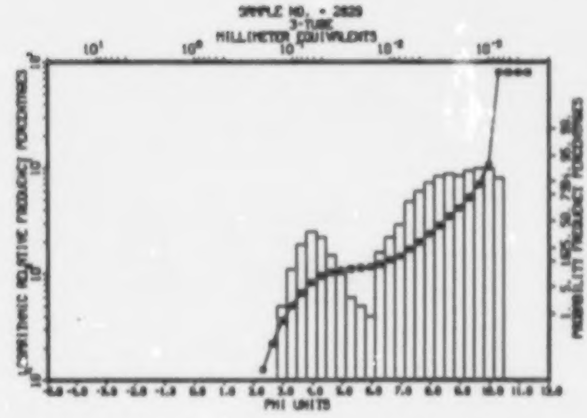
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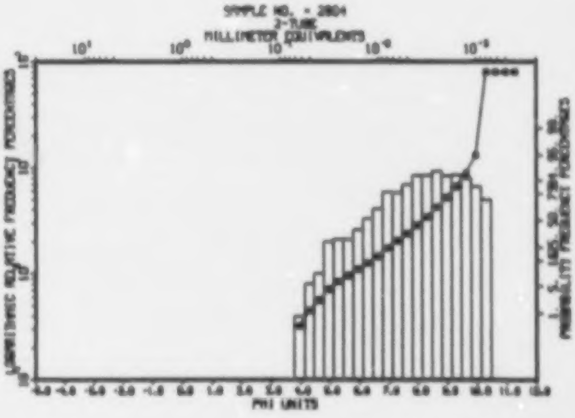
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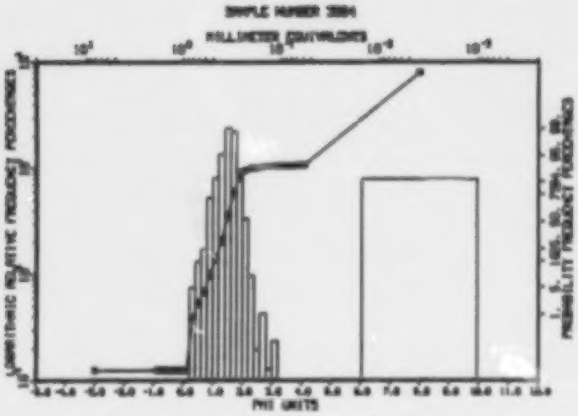
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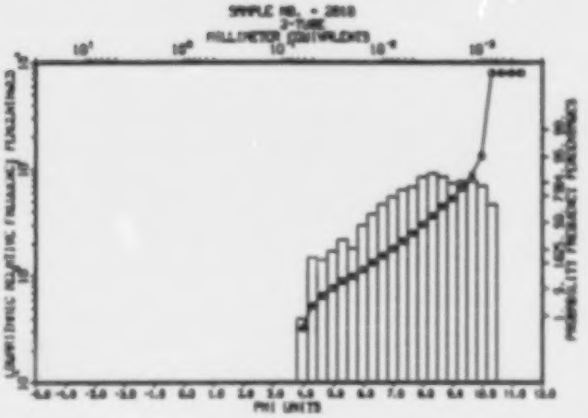
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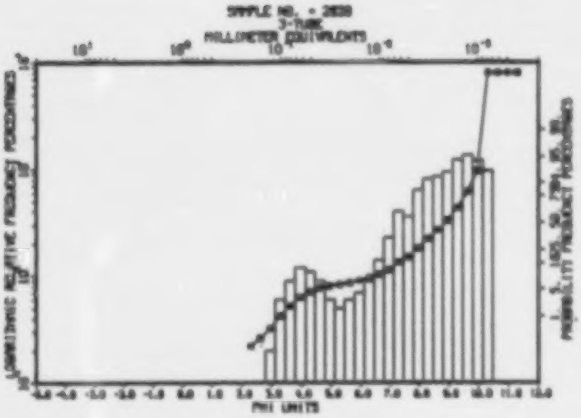
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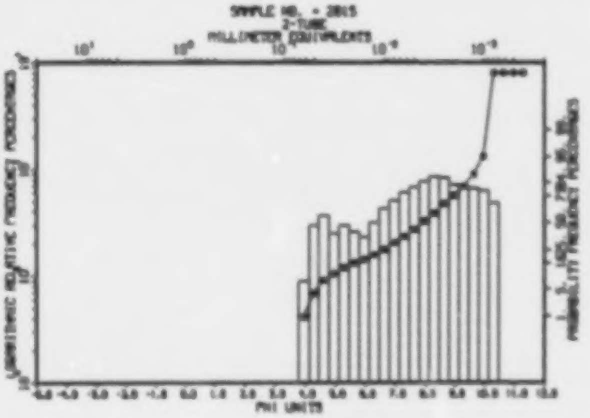
PHI UNITS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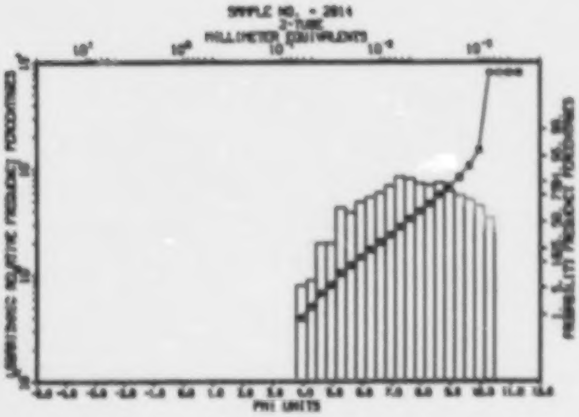
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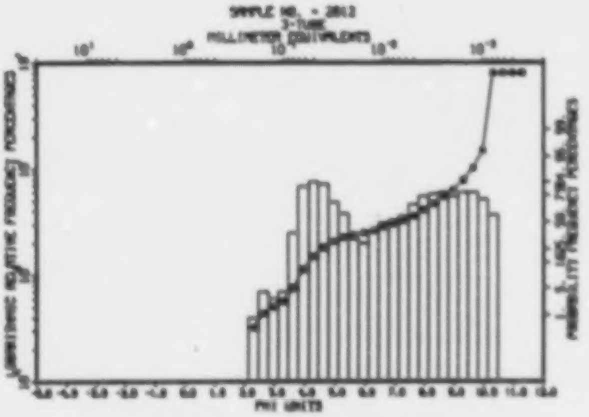
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PHI UNITS

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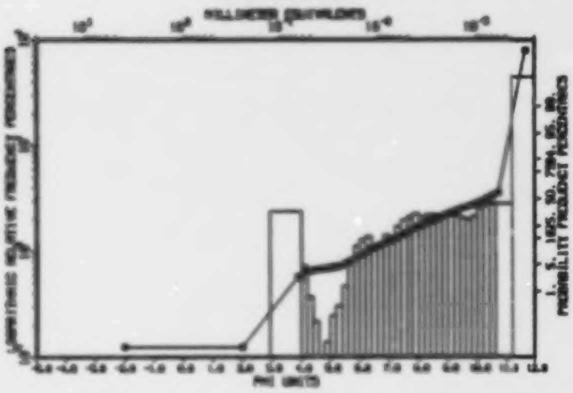

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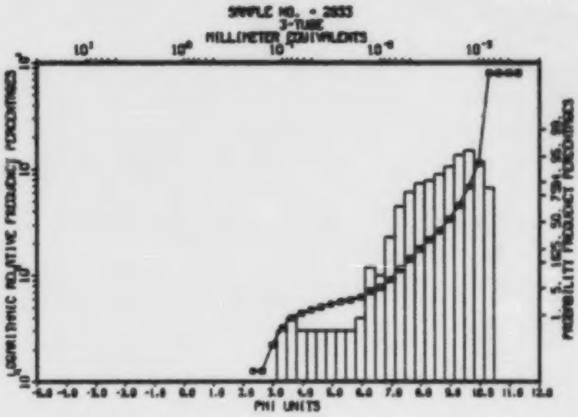

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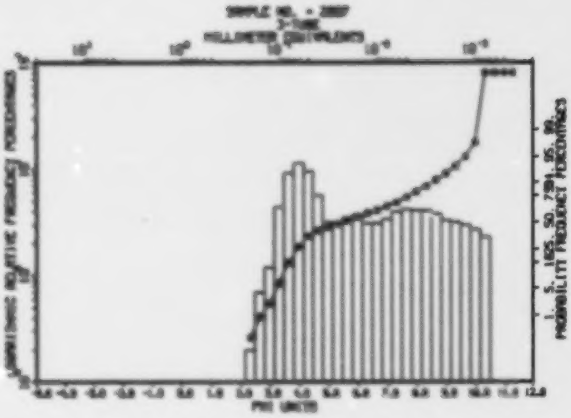

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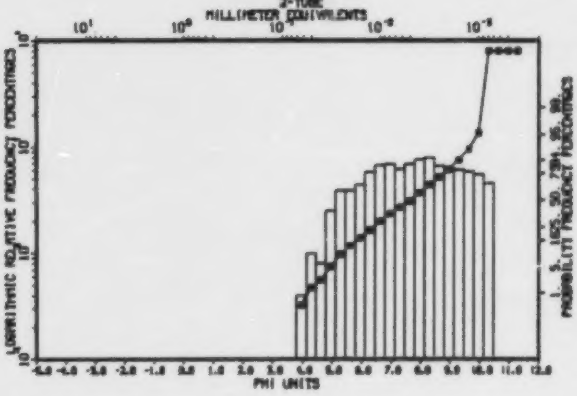

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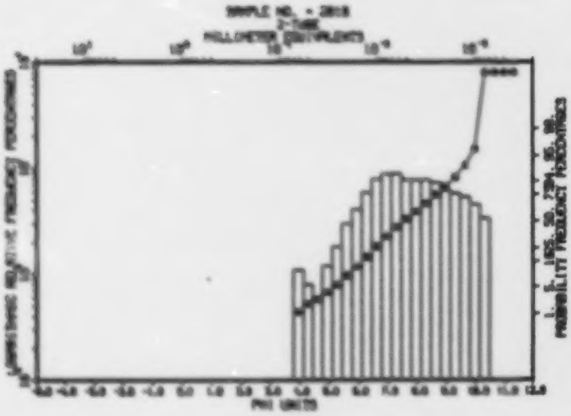

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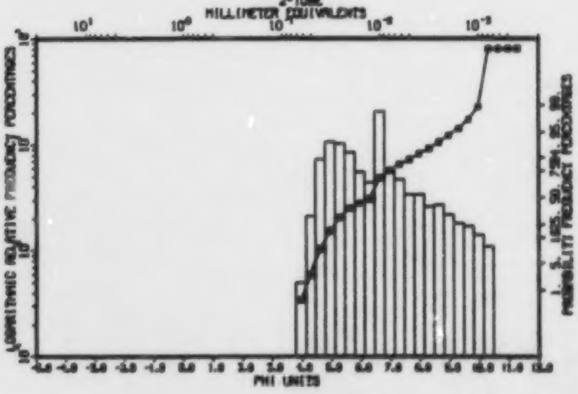

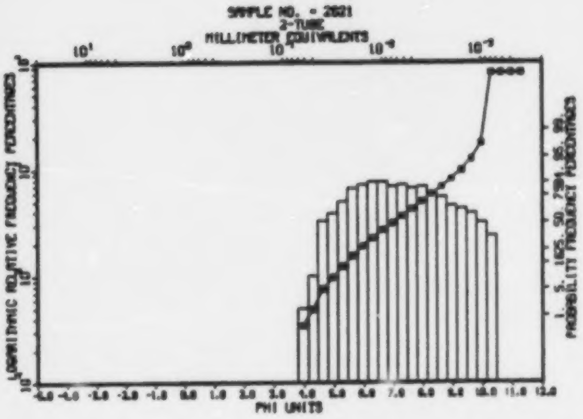
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10⁻¹
10⁻²
10⁻³
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PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7384. 95. 99.
PHI UNITS
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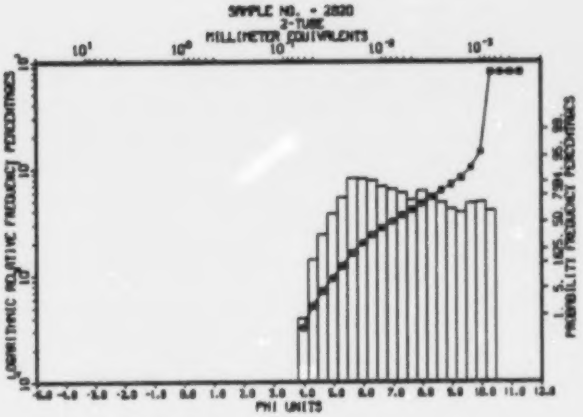
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10⁰
10⁻¹
10⁻²
10⁻³
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PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7384. 95. 99.
PHI UNITS
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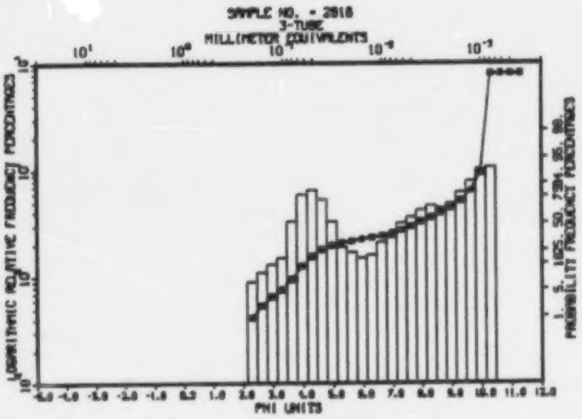
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10⁰
10⁻¹
10⁻²
10⁻³
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PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7384. 95. 99.
PHI UNITS
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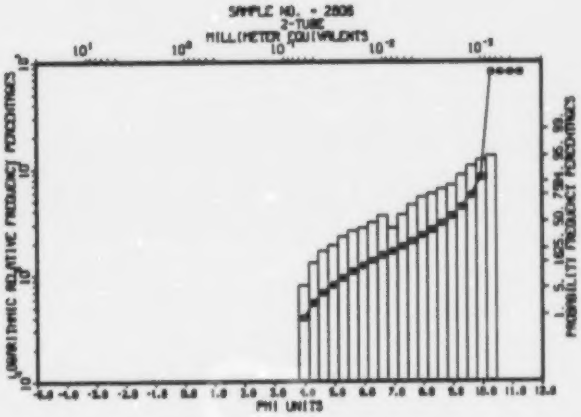
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10⁻¹
10⁻²
10⁻³
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PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7384. 95. 99.
PHI UNITS
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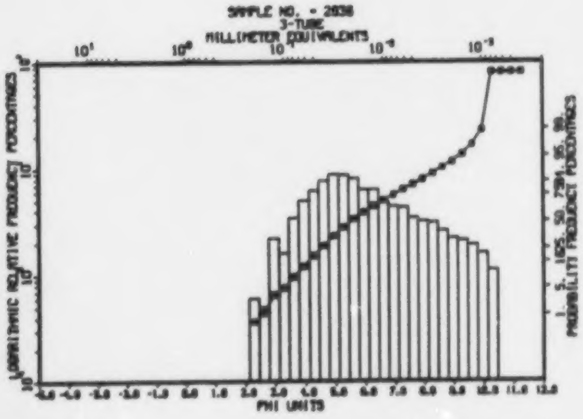
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10⁰
10⁻¹
10⁻²
10⁻³
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PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7384. 95. 99.
PHI UNITS
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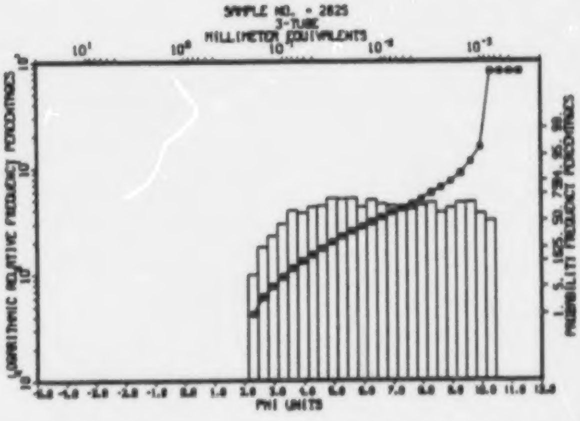
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10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7384. 95. 99.
PHI UNITS
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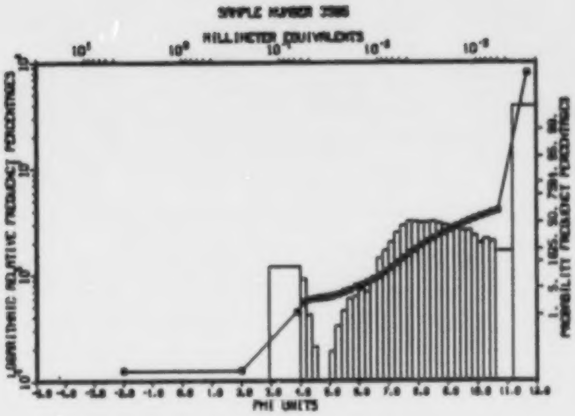
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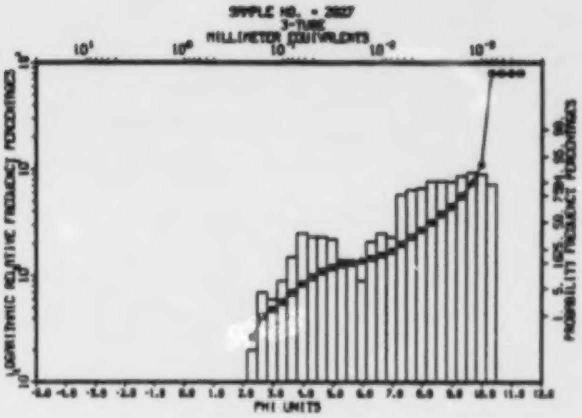
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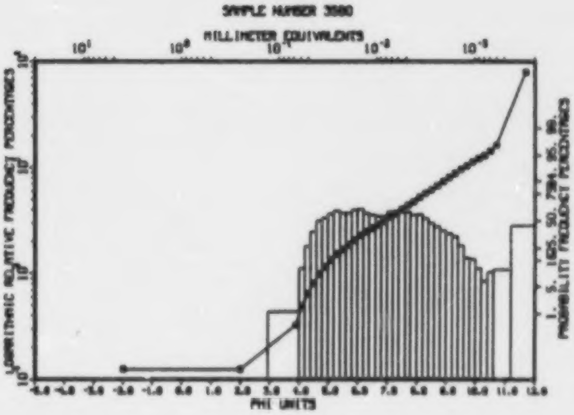
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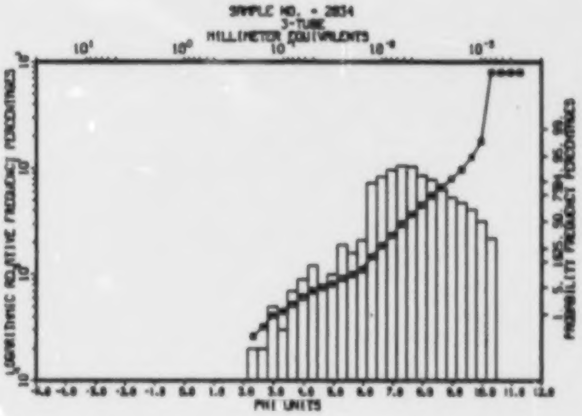
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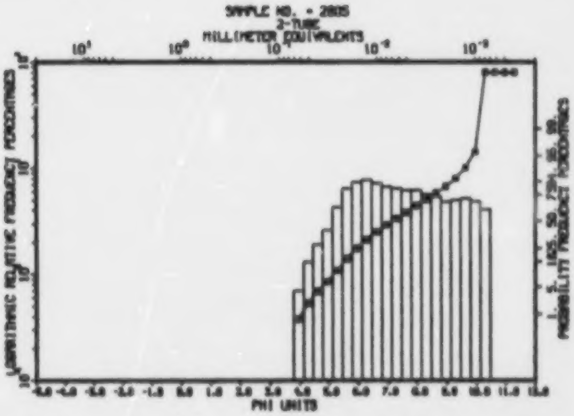
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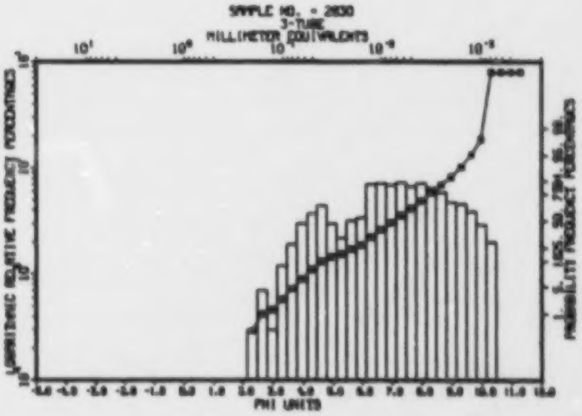
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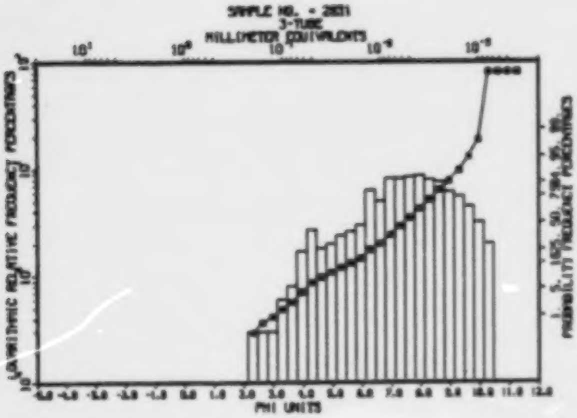
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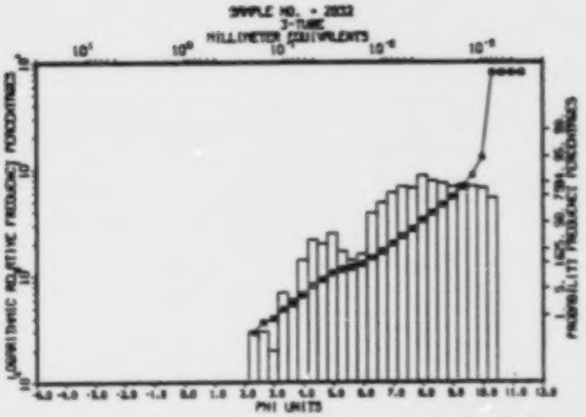
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS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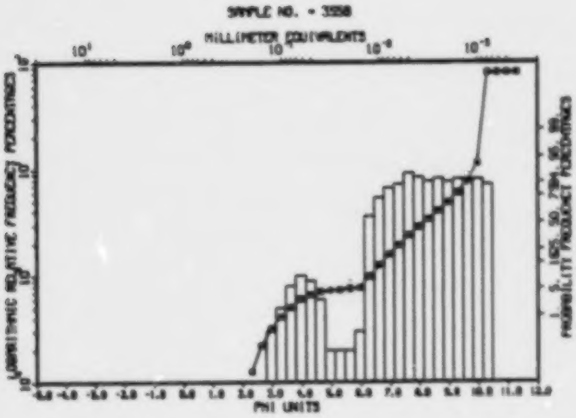
PHI UNITS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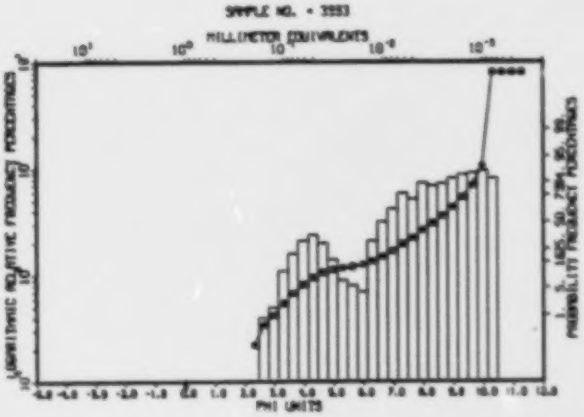
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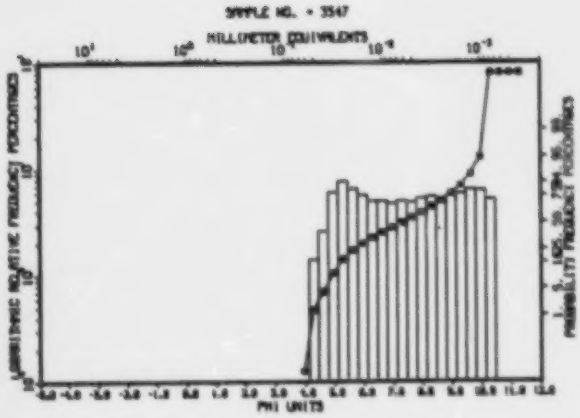
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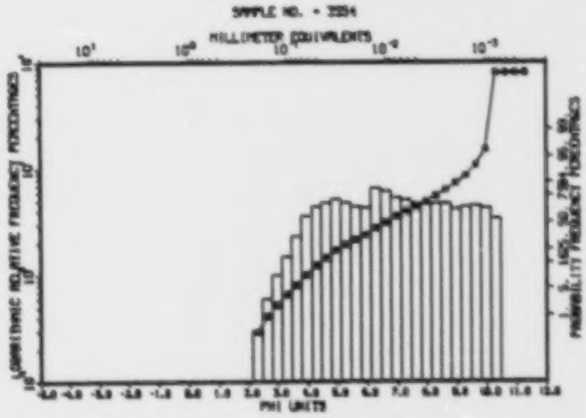
PHI UNITS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PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

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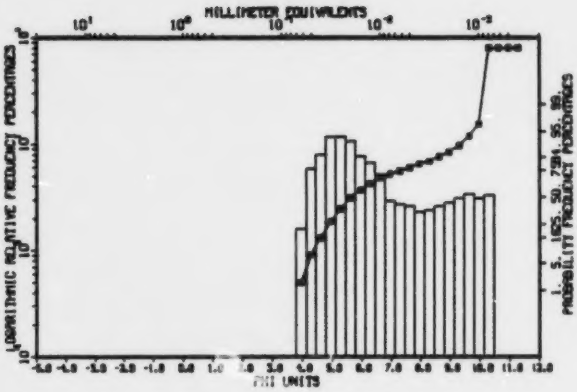

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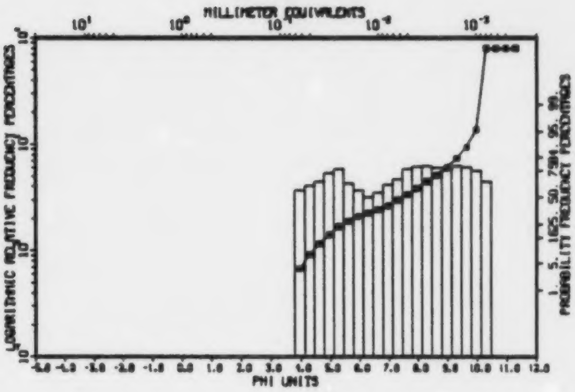

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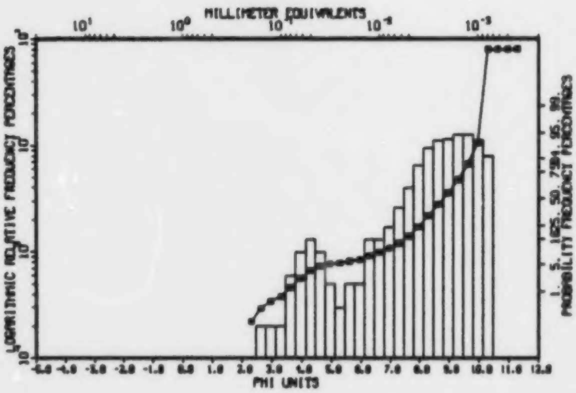

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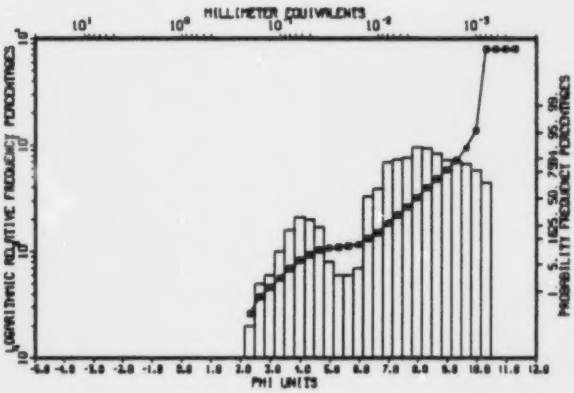

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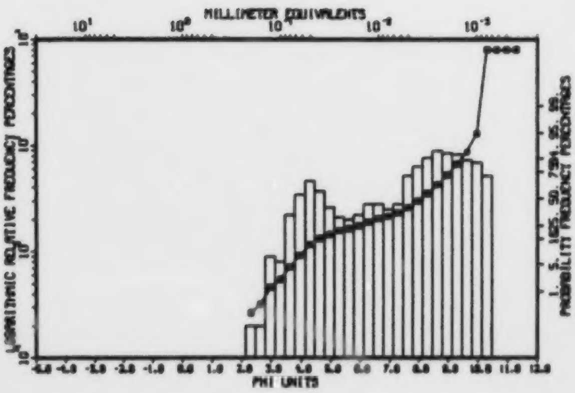

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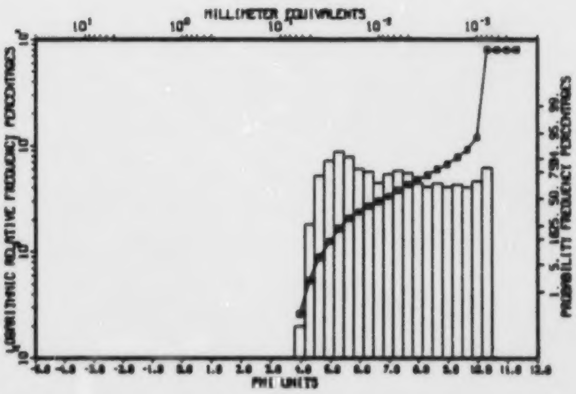

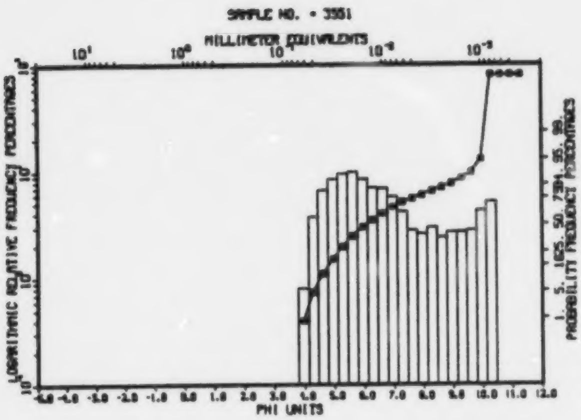
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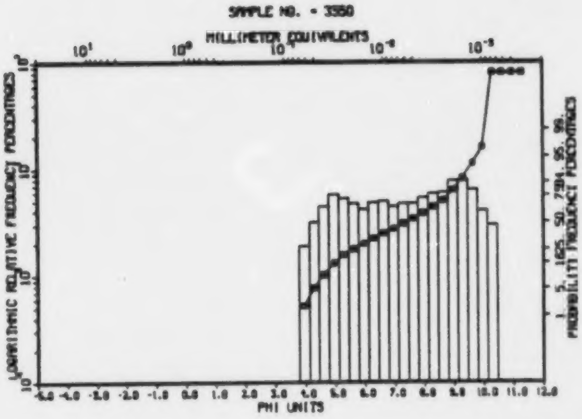
10^{-1}
10^{-2}
10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^{2}
10^{1}
10^{0}
10^{-1}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS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10^{-1}
10^{-2}
10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^{2}
10^{1}
10^{0}
10^{-1}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

CHAPTER 5

GRAIN-SIZE CHARACTERISTICS OF AEOLIAN SEDIMENTS FROM FIORD HEADS ON BAFFIN ISLAND

Cheryl McKenna Neuman and Robert Gilbert
Department of Geography
Queen's University, Kingston, Ontario K7L 3N6

For his paper on the grain-size characteristics of Quaternary sediments from Baffin Island, Andrews (1985) was able to find analyses of only 51 samples of aeolian sediment from two sites, although he and other workers recognise that these materials are a significant component of the terrestrial and marine sedimentary record, both in terms of the amount involved and the palaeoclimatic and palaeogeomorphic information they contain. Grain-size analysis of aeolian sediment has since been carried out to characterize a range of deposits in the vicinity of Crater Lake in Pangnirtung Pass (McKenna Neuman and Gilbert, 1986; McKenna Neuman, in preparation). During the shore-based portion of the S.A.F.E. operation in 1985, samples were collected from aeolian deposits in Coronation, Maktak, and Itirbilung Fiords. Several samples were collected from the south side of the sandur at McBeth Fiord, but the extensive deposit on the north side was not examined.

In the laboratory 20 to 40 g of each sample were sieved at 0.5 phi intervals from 62 um to 8 mm using Canada standard 8" diameter sieves. Analysis in a Sedigraph 5000D apparatus was carried out on the portion less than 62 um (silt size) in samples containing more than 5% by weight.

The results are presented in tables following arranged according to location and environment of deposition. The fractions of gravel (>2 mm diameter), sand, and silt (<62 um diameter) are listed. None of the samples contained measurable clay-sized material. Summary statistics are moment measures following Friedman (1961). Detailed descriptions of sample locations and grain-size distributions are available from the authors.

On the crest of the ice-cored esker at Coronation Glacier two samples were recovered (Table 1) C1 granular particles from the crest of ripples, C2 the finer particles in the troughs. Miscellaneous samples from Itirbilung Fiord are shown in Table 2. IT2-8, and 11-12 are from deposits above the beach and on a fan on the south side of the sandur, both near the head of the fiord. It9 is from a deposit of granules in the lee of a small cut bank near the south side of the sandar about 500 m from the fiord head. It10 is from a silty sand veneer on the south valley side especially in the lee of boulders about 25 m above the sandur surface 2 km up sandur. Samples from the surface of infilling of the top of an ice wedge, part of a polygonal structure on the sandur surface about 1 km up sandur are listed in Table 3.

Samples in a transect of Maktak aeolian deposit are shown in Table 8. The transect is from west to east (down the prevailing wind) along a line about half way across the deposit (north-south). The sample interval is about 165 m (200 paces). Total transect length is 2.14 km. The samples in Table 7 are from among the rocks of a vegetated talus fan (the main ground cover is the heather, Cassopia tetragonia) about 500 m east of the main sand body. The samples in Table 6 are from the blowout immediately east of the main sand body. Samples MA8-11 (Table 5) are on a transect up the valley side above the east end of the main sand body from the top edge of the body and at heights of 25, 75 and 100 m above. Samples MA12 and 13 are from granules and silts at the top of the main sand body about 300 m west.

Samples shown in table 9 are from the south side of McBeth Fiord along the sides to the south of the muddy sandur surface and at the base of the island on the sandur.

Samples shown in Tables 10 through 30 are from the Crater Lake area in Pangnirtung Pass (Fig. 1). The samples are organized by type of aeolian deposit.

Tables 10 through 12 contain grain size data for samples collected from three large sand sheets due east of Crater Lake. Sand and granular ripples comprise much of the surface area of these sheets (Fig. 2a), although they are occasionally planar. The ripple crest, ripple trough and planar surface samples are organized in tables 10, 11 and 12 respectively.

Climbing dunes (Fig.2b) are found exclusively on the south facing sides of the larger moraines and terraces in Pangnirtung Pass. Samples were collected along two transects, one upslope in a north-south orientation and one along the major axis in an east-west orientation, for each of three dunes as found in Tables 13 to 17.

Small dunes less than 1 m in height are typically deposited on the south facing sides of a majority of ventifacts in the region (Fig. 2c). Samples from crests, interdune areas and tails of these deposits are are presented in Tables 18, 19 and 20 respectively.

Plants are very important in trapping windblown sand in outwash areas and in shielding these sediments from further deflation. The resultant accumulations range in size from small patches of sand trapped by individual plants (Fig. 2d, Table 21) to parabolic, linear and other complex dunes which may grow to more than 1 m in height (Fig. 2e, Tables 22 to 29). The most prolific of these vegetation trapped features are found up on the valley sides and are typically finer than similar deposits on the valley floor.

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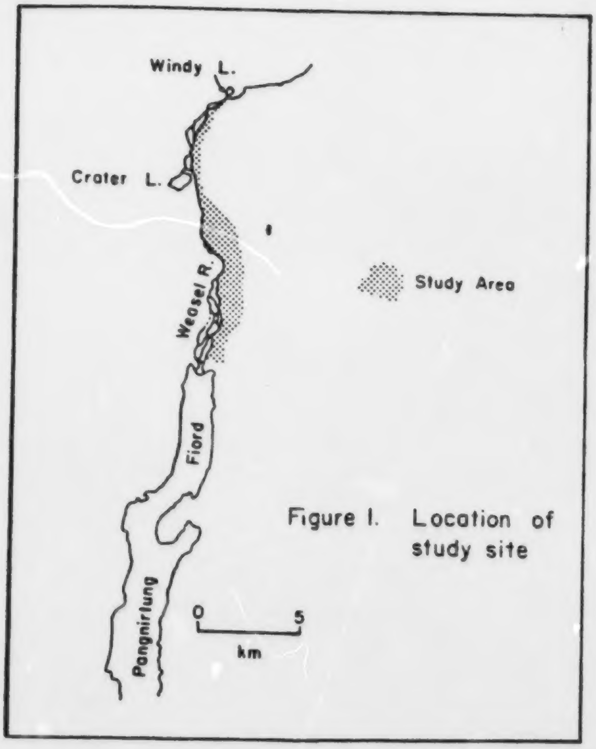

Figure I. Location of study site

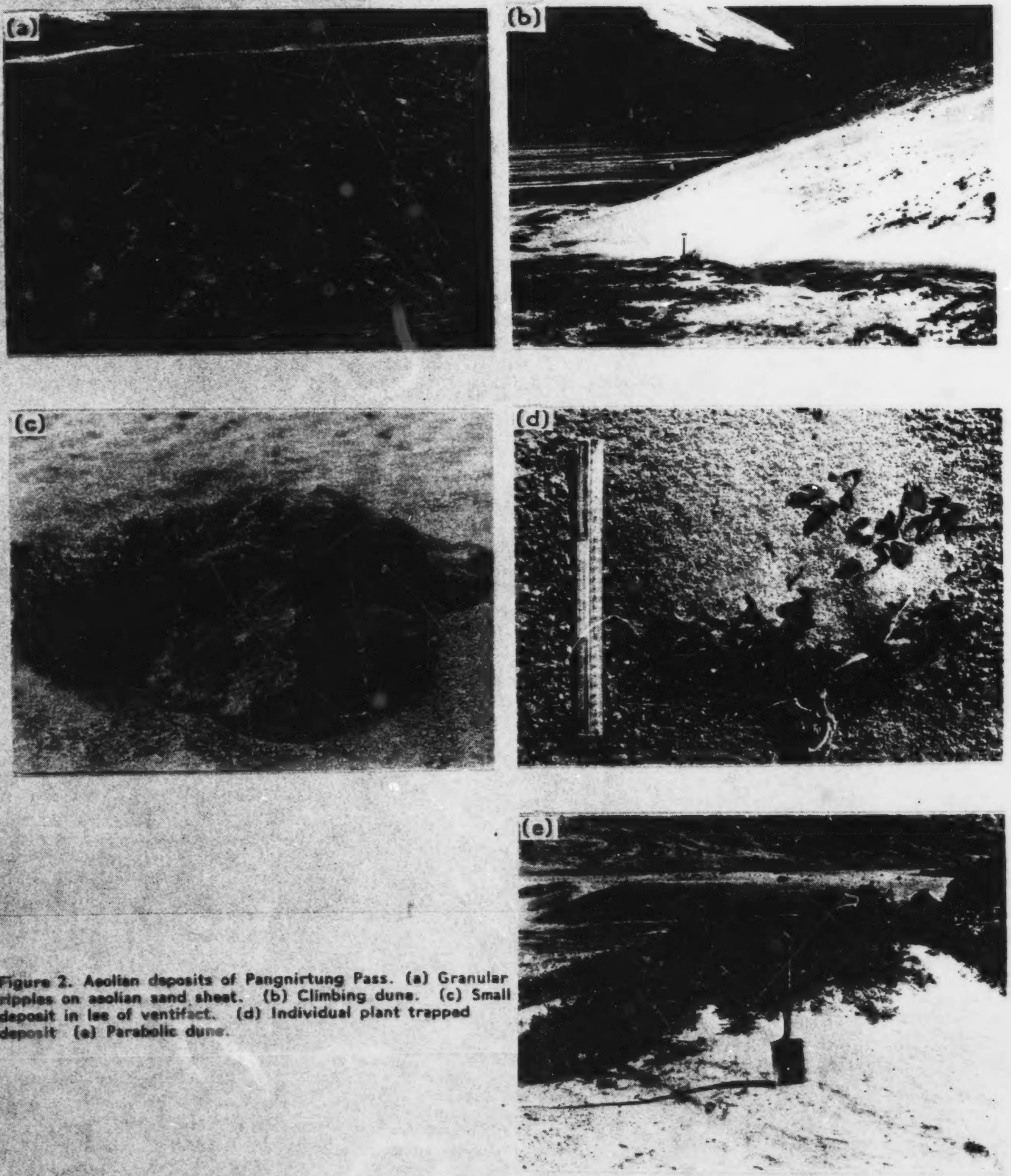

Figure 2. Aeolian deposits of Pangnirtung Pass. (a) Granular ripples on aeolian sand sheet. (b) Climbing dune. (c) Small deposit in lee of ventifact. (d) Individual plant trapped deposit (e) Parabolic dune.

TABLE 1. GRAIN SIZE SUMMARY FOR CORONATION
JUVENILE AEOLIAN DEPOSIT ON ESKER NEAR GLACIER

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD. DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
C1	0.0293	0.8710	0.0997	2.056	0.2405	1.390	-0.419	2.926
C2	0.0031	0.9094	0.0875	2.486	0.17851	0.944	-0.020	3.405

TABLE 2. GRAIN SIZE SUMMARY ITIRBILUNG
ASSORTED AEOLIAN DEPOSITS

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD. DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
IT 2	0.0000	0.9867	0.0133	1.253	0.4195	0.996	0.811	3.154
IT 3	0.0000	0.9545	0.0455	2.867	0.1370	0.808	-0.261	2.353
IT 4	0.0000	0.9649	0.0351	2.426	0.1861	0.746	0.289	3.123
IT 5	0.0004	0.9989	0.0007	1.268	0.4151	0.616	0.106	3.388
IT 6A	0.0016	0.7946	0.2038	2.776	0.1459	1.082	-0.353	2.793
IT 6B	0.0000	0.9993	0.0007	1.177	0.4423	0.524	0.456	4.280
IT 8	0.0006	0.9403	0.0590	2.473	0.1800	0.846	0.362	2.695
IT 9	0.7854	0.2130	0.0016	-1.178	2.2629	0.981	2.769	11.176
IT 10	0.0007	0.4203	0.5790	3.668	0.0786	0.948	-2.058	7.271
IT 11	0.0024	0.9751	0.0225	2.423	0.1864	0.685	-0.047	5.647
IT 12	0.0000	0.9735	0.0265	2.047	0.2420	0.912	0.320	2.607

TABLE 3. GRAIN SIZE SUMMARY ITIRBILUNG2
AEOLIAN INFILLED ICE WEDGE CASTS

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD. DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
IT1	0.0183	0.8437	0.1380	2.656	0.1586	1.285	-1.160	4.326
IT7	0.0060	0.9864	0.0077	0.415	0.7499	1.033	1.609	5.379

TABLE 4. GRAIN SIZE SUMMARY MAKTAK1
DEPOSITS ADJACENT TO EAST END OF SAND SHEET

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
MA 6	0.0692	0.9308	0.0000	-0.307	1.2370	0.716	2.292	11.486
MA 7	0.0000	0.9932	0.0069	2.003	0.2494	0.804	0.212	2.571

TABLE 5. GRAIN SIZE SUMMARY MAKTAK2
TRANSECT UPSLOPE FROM AEOLIAN SAND SHEET

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
MA 8	0.0000	0.9508	0.0492	2.881	0.1357	0.601	0.196	3.243
MA 9	0.0000	0.9439	0.0561	3.057	0.1201	0.586	-0.312	4.327
MA 10	0.0000	0.6945	0.3055	3.540	0.0859	0.672	-1.265	6.223
MA 11	0.0000	0.7792	0.2208	3.437	0.0923	0.670	-1.409	8.248
MA 12	0.3046	0.6026	0.0928	1.365	0.3883	2.234	-0.383	1.513
MA 13	0.0000	0.8653	0.1347	2.999	0.1250	0.822	-0.262	2.576

TABLE 6. GRAIN SIZE SUMMARY MAKTAK3 -- AEOLIAN RIPPLES

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
MA 3	0.0000	0.8303	0.1697	3.376	0.0963	0.566	-0.250	3.646
MA 4	0.0000	0.8531	0.1469	3.303	0.1013	0.608	-0.440	4.068
MA 5	0.0000	0.7411	0.2589	3.457	0.0910	0.619	-0.338	2.808

TABLE 7. GRAIN SIZE SUMMARY MAKTAK4 -- VEGETATED DEPOSITS

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
MA 1	0.0000	0.6395	0.3605	3.621	0.08129	0.613	-0.926	4.631
MA 2	0.0000	0.5771	0.4229	3.732	0.07528	0.559	-1.183	6.198

TABLE 8. GRAIN SIZE SUMMARY MAKTAK5 -- SAND SHEET

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
MA14LA	0.1064	0.8810	0.0127	0.599	0.6601	1.411	0.535	2.448
MA15LA	0.0000	0.9897	0.0104	2.013	0.2478	0.819	0.036	3.056
MA16LA	0.0520	0.9180	0.0300	1.234	0.4251	1.479	0.054	2.050
MA17LA	0.0459	0.9541	0.0000	0.452	0.7312	1.206	0.888	3.111
MA18LA	0.0003	0.9848	0.0149	1.312	0.4028	1.035	0.607	3.041
MA19LA	0.0096	0.9572	0.0332	1.461	0.3631	1.278	0.268	2.355
MA20LA	0.0050	0.9950	0.0000	0.616	0.6526	0.948	0.924	3.671
MA21LA	0.0037	0.9703	0.0260	1.472	0.3605	1.300	0.242	2.124
MA22LA	0.0021	0.9856	0.0123	0.652	0.6363	1.146	1.146	3.913
MA23LA	0.0065	0.9803	0.0132	1.076	0.4743	1.221	0.535	2.537
MA24LA	0.0025	0.9879	0.0096	0.970	0.5103	1.079	0.787	3.201
MA25LA	0.0103	0.9874	0.0022	0.608	0.6560	1.188	0.897	3.000
MA26LA	0.0000	0.9704	0.0296	1.535	0.3450	1.171	0.540	2.391
MA27LA	0.0000	0.9876	0.0124	1.195	0.4366	1.124	0.717	2.703

TABLE 9. GRAIN SIZE SUMMARY MCBETH

SAMPLE	GRAVEL	SAND	SILT	MEAN (PHI)	(MM)	STD.DEV. (PHI)	SKEWNESS	KURTOSIS
MC 1	0.0077	0.9829	0.0094	1.383	0.3833	0.772	0.623	6.056
MC 2	0.0005	0.9925	0.0070	1.537	0.3445	0.837	0.305	3.323
MC 4	0.0000	0.9991	0.0009	1.780	0.2912	0.444	0.311	4.155
MC 5	0.7571	0.2415	0.0014	-1.231	2.3466	0.949	2.552	9.991
MC 3	0.0830	0.9139	0.0031	-0.008	1.0056	0.960	1.019	4.339

TABLE 10. GRAIN SIZE SUMMARY PANGNIRTUNG SAND SHEET RIPPLE CRESTS

SAMPLE	GRAVEL	SAND	SILT	MEAN (PHI)	(MM)	STD.DEV. (PHI)	SKEWNESS	KURTOSIS
232SS2T1	0.4298	0.5702	0.0000	-0.843	1.7936	0.865	0.450	3.362
221SS2T1	0.2651	0.7349	0.0000	-0.489	1.4032	0.848	0.779	4.292
229SS2T1	0.3143	0.6857	0.0000	-0.548	1.4621	1.030	0.853	4.106
215SS2T1	0.3479	0.6521	0.0000	-0.567	1.4812	1.075	0.715	3.589
233SS2T1	0.1602	0.8398	0.0000	-0.435	1.3523	0.692	1.000	5.069
234	0.1823	0.8177	0.0000	-0.282	1.2156	0.886	1.047	4.089
235SS2T1	0.5500	0.4500	0.0000	-1.013	2.0181	0.800	1.052	5.438
210SS2T1	0.1522	0.8470	0.0009	-0.345	1.2704	0.760	0.986	6.018
S21(19)C	0.8551	0.1449	0.0000	-1.795	3.4693	0.934	1.987	7.645
S21(20)C	0.7927	0.2073	0.0000	-1.564	2.9564	0.902	1.375	5.789
S21(17)C	0.8051	0.1949	0.0000	-1.682	3.2077	0.794	0.689	3.605
S21(15)C	0.6416	0.3584	0.0000	-1.102	2.1465	1.290	1.153	4.083
S21(13)C	0.6916	0.3084	0.0000	-1.466	2.7625	1.084	1.066	4.260
S21(12)C	0.7436	0.2564	0.0000	-1.567	2.9623	1.029	1.050	4.243
S21(10)W	0.6986	0.3014	0.0000	-1.503	2.8346	1.789	1.200	3.367
S21(10)C	0.4353	0.5647	0.0000	-0.959	1.9436	1.145	0.553	3.773
S213C	0.4850	0.5150	0.0000	-0.691	1.6146	1.368	0.711	2.889
S211WC	0.5959	0.4041	0.0000	-0.951	1.9332	2.020	0.685	2.225
S212WC	0.7008	0.2993	0.0000	-1.208	2.3095	1.891	1.082	2.737
329SS2T2	0.5404	0.4596	0.0000	-0.995	1.9929	0.505	0.803	4.302
333SS2T2	0.6804	0.3196	0.0000	-1.215	2.3221	0.750	1.358	5.651
352SS2T2	0.8095	0.1905	0.0000	-1.320	2.4970	0.445	0.417	4.307
340SS2T2	0.2176	0.7824	0.0000	-0.561	1.4749	0.646	1.167	5.918
342SS2T2	0.0882	0.9118	0.0000	-0.398	1.3179	0.515	0.798	5.437
349SS2T2	0.0605	0.9395	0.0000	-0.263	1.2001	0.715	1.790	7.844
345SS2T2	0.0037	0.5586	0.4377	3.355	0.0977	1.180	-2.068	7.393
330SS2T2	0.1176	0.8824	0.0000	-0.443	1.3590	0.513	0.490	4.677
S228WC M	0.5637	0.4363	0.0000	-0.753	1.6849	1.642	0.905	2.711
S229C	0.4825	0.5175	0.0000	-0.744	1.6750	1.473	0.663	2.616
388SS2T3	0.7349	0.2651	0.0000	-1.345	2.5401	0.735	1.290	6.027
396SS2T3	0.8342	0.1658	0.0000	-1.512	2.8524	0.586	1.032	4.477
385SS2T3	0.8611	0.1389	0.0000	-1.493	2.8139	0.521	0.990	4.648
382SS2T3	0.5236	0.4764	0.0000	-1.023	2.0319	0.507	0.367	3.568
393SS2T3	0.9966	0.0034	0.0000	-2.120	4.3471	0.282	1.438	5.869
397SS2T3	0.5708	0.4292	0.0000	-1.083	2.1177	1.130	1.128	4.743
399SS2T3	0.4341	0.5659	0.0000	-0.681	1.6028	1.184	1.293	4.769
381SS2T3	0.9276	0.0724	0.0000	-1.623	3.0812	0.410	0.642	3.703

TABLE 10. continued ...

SAMPLE	GRAVEL	SAND	SILT	MEAN (PHI)	(MM)	STD.DEV. (PHI)	SKEWNESS	KURTOSIS
394SS2T3	0.5182	0.4818	0.0000	-0.988	1.9840	0.665	0.436	3.026
387SS2T3	0.8081	0.1919	0.0000	-1.231	2.3468	0.366	0.391	4.852
395SS2T3	0.3658	0.6342	0.0000	-0.827	1.7733	0.705	0.185	3.496
304SS2T3	0.6739	0.3261	0.0000	-1.197	2.2927	0.571	0.701	4.127
299SS2T3	0.4164	0.5836	0.0000	-0.881	1.8414	0.637	0.666	4.266
316SS2T3	0.2992	0.7008	0.0000	-0.307	1.2368	1.225	0.932	3.276
325SS2T3	0.3686	0.6314	0.0000	-0.849	1.8017	0.560	1.725	9.076
313SS2T3	0.4999	0.5002	0.0000	-0.948	1.9287	0.625	1.238	6.902
S224WC	0.8758	0.1242	0.0000	-1.920	3.7846	1.189	2.181	8.093
S226WC	0.8722	0.1278	0.0000	-1.929	3.8068	1.271	2.245	7.787
S229WC	0.7520	0.2480	0.0000	-1.450	2.7326	1.388	1.399	4.467
S2210WC	0.7408	0.2592	0.0000	-1.440	2.7129	1.301	1.345	4.708
S229C	0.7497	0.2503	0.0000	-1.419	2.6735	0.822	1.137	4.999
S225WC	0.9479	0.0521	0.0000	-1.936	3.8260	0.634	1.982	12.000
S233WC	0.7719	0.2281	0.0000	-1.475	2.7799	1.281	1.483	5.055
252SS3	0.9272	0.0728	0.0000	-1.498	2.8249	0.375	0.321	3.700
247SS3	0.1120	0.8880	0.0000	-0.286	1.2194	0.722	1.089	5.334
244SS3	0.3600	0.6400	0.0000	-0.733	1.6626	0.563	0.863	3.783
258SS3	0.2251	0.7749	0.0000	-0.488	1.4027	0.644	0.897	4.067
241SS3	0.2376	0.7624	0.0000	-0.557	1.4713	0.611	0.716	3.338
240SS3	0.1001	0.8999	0.0000	-0.176	1.1300	0.664	0.432	3.761
249SS3	0.2012	0.7988	0.0000	-0.782	1.7190	0.339	-0.067	4.447
255SS3	0.5209	0.4791	0.0000	-0.927	1.9011	0.551	1.761	8.854
365SS3	0.1635	0.8365	0.0000	-0.610	1.5259	0.451	0.525	3.963
237SS3	0.2939	0.7061	0.0000	-0.664	1.5845	0.629	1.279	5.966
250SS3	0.3487	0.6513	0.0000	-0.814	1.7579	0.527	0.495	4.228
251SS3	0.6865	0.3135	0.0000	-1.141	2.2060	0.546	1.180	6.155
261SS3	0.1843	0.8157	0.0000	-0.521	1.4350	0.520	0.090	2.940
264SS3	0.0548	0.9452	0.0000	-0.077	1.0545	0.636	0.651	4.387
236SS3	0.4523	0.5477	0.0000	-0.966	1.9535	0.290	0.169	3.008
S344C ME	0.8526	0.1474	0.0000	-1.389	2.6195	0.660	2.535	12.955
S343CMIN	0.1744	0.8256	0.0000	-0.091	1.0650	1.003	0.754	3.247
S342C ME	0.8989	0.1011	0.0000	-1.539	2.9065	0.615	2.123	10.691
S341C ME	0.4463	0.5537	0.0000	-0.779	1.7156	0.719	1.592	6.777
S353C ME	0.8939	0.1061	0.0000	-1.441	2.7152	0.449	2.751	23.921
177SS1	0.6366	0.3634	0.0000	-1.115	2.1660	0.453	0.760	5.440
193SS1	0.1145	0.8836	0.0019	0.368	0.7748	1.370	0.656	2.127
203SS1	0.0828	0.9166	0.0007	0.428	0.7432	1.327	0.560	1.947
191SS1	0.0095	0.9905	0.0000	-0.127	1.0922	0.597	1.569	6.911
198SS1	0.0362	0.9638	0.0000	-0.295	1.2271	0.587	1.994	9.706
179SS1	0.1642	0.8358	0.0000	-0.505	1.4194	0.555	0.524	3.767
363SS1	0.0069	0.9926	0.0006	0.343	0.7881	0.699	1.649	7.499
151SS1	0.0098	0.9869	0.0033	0.432	0.7411	0.850	1.552	6.404
156SS1	0.0000	0.9936	0.0064	1.271	0.4144	0.930	0.629	3.223
146SS1	0.0083	0.9917	0.0000	-0.137	1.0992	0.578	1.692	7.917
163SS1	0.0077	0.9923	0.0000	-0.107	1.0767	0.513	1.423	8.717
133SS1	0.0917	0.8955	0.0127	0.787	0.5797	1.452	0.338	2.229
135SS1	0.0044	0.9956	0.0000	0.063	0.9574	0.631	1.801	8.234

TABLE 11. GRAIN SIZE SUMMARY PANGNIRTUNG SAND SHEET RIPPLE TROUGHS

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
231SS2T1	0.0490	0.9392	0.0118	0.993	0.5025	1.400	-0.049	2.541
207SS2T1	0.0318	0.9595	0.0087	0.879	0.5436	1.111	0.469	3.624
213SS2T1	0.0496	0.9324	0.0180	1.259	0.4179	1.350	-0.171	2.790
230SS2T1	0.2073	0.7927	0.0000	0.442	0.7358	1.588	0.006	2.120
211SS2T1	0.1149	0.8670	0.0181	1.353	0.3914	1.574	-0.484	2.335
216SS2T1	0.0662	0.8958	0.0381	1.587	0.3327	1.415	-0.344	2.618
208SS2T1	0.2656	0.7344	0.0000	0.297	0.8139	1.774	0.076	2.057
227SS2T1	0.2121	0.7879	0.0000	-0.338	1.2637	0.954	1.115	4.572
214SS2T1	0.0193	0.9807	0.0000	0.927	0.5259	1.101	0.272	2.431
217SS2T1	0.2718	0.7282	0.0000	-0.403	1.3219	0.952	0.759	3.776
223	0.2442	0.7558	0.0000	-0.362	1.2847	1.061	0.719	3.669
228SS2T1	0.1553	0.8447	0.0000	0.082	0.9447	1.230	0.835	2.849
212SS2T1	0.0508	0.9310	0.0182	0.865	0.5491	1.280	0.665	2.822
218SS2T1	0.4201	0.5643	0.0157	-0.026	1.0184	1.789	0.532	2.111
206SS2T1	0.1015	0.8985	0.0000	-0.158	1.1156	0.959	1.355	5.222
S213T	0.3171	0.6829	0.0000	0.479	0.7172	2.117	-0.228	1.725
331SS2T2	0.0778	0.9196	0.0027	0.712	0.6103	1.287	0.177	2.118
354SS2T2	0.0589	0.9399	0.0012	0.480	0.7171	1.212	0.486	2.315
326SS2T2	0.5773	0.4228	0.0000	-0.818	1.7625	1.009	1.702	5.961
338SS2T2	0.0159	0.9837	0.0004	0.291	0.8173	0.933	1.193	4.202
327SS2T2	0.0373	0.9411	0.0216	1.633	0.3225	1.144	-0.519	4.210
350SS2T2	0.2416	0.7584	0.0000	0.166	0.8911	1.555	-0.099	2.226
335SS2T2	0.0591	0.9409	0.0000	1.086	0.4711	1.505	0.088	2.089
332SS2T2	0.0357	0.9643	0.0000	0.827	0.5637	1.216	0.373	2.390
336SS2T2	0.0130	0.9584	0.0286	1.850	0.2773	1.278	-0.434	2.568
348SS2T2	0.0820	0.9180	0.0000	0.022	0.9850	0.914	1.154	5.097
386SS2T3	0.1936	0.7937	0.0127	0.665	0.6308	1.622	0.155	2.011
400SS2T3	0.2000	0.8000	0.0000	0.309	0.8070	1.379	0.146	2.424
383SS2T3	0.0750	0.9242	0.0008	0.484	0.7151	1.107	0.140	2.292
384SS2T3	0.2561	0.7348	0.0091	0.083	0.9442	1.494	0.692	2.669
389SS2T3	0.3254	0.6581	0.0165	0.302	0.8109	1.734	0.334	1.954
390SS2T3	0.2624	0.7376	0.0000	0.413	0.7509	1.606	-0.031	1.802
391SS2T3	0.2407	0.7593	0.0000	0.743	0.5973	1.844	-0.351	1.964
398SS2T3	0.0130	0.9827	0.0043	0.943	0.5202	0.988	0.477	3.079
380SS2T3	0.3232	0.6768	0.0000	0.030	0.9795	1.469	0.327	2.189
314SS2T3	0.1120	0.8818	0.0062	0.756	0.5919	1.395	0.139	2.080
315SS2T3	0.0483	0.9344	0.0173	1.413	0.3754	1.305	-0.355	2.631
310SS2T3	0.1409	0.8334	0.0257	1.374	0.3857	1.687	-0.515	2.261
312SS2T3	0.1071	0.8858	0.0071	0.465	0.7242	1.266	0.490	2.630
322SS2T3	0.0293	0.9650	0.0057	0.626	0.6480	1.224	0.591	2.538
243SS3	0.1428	0.8569	0.0003	0.278	0.8244	1.088	-0.029	2.354
260SS3	0.1589	0.8411	0.0000	-0.225	1.1691	0.974	0.588	3.616
238SS3	0.2710	0.7290	0.0000	-0.322	1.2502	1.004	0.173	2.607
262SS3	0.0345	0.9655	0.0000	0.518	0.6982	1.051	0.620	3.015
245SS3	0.0313	0.9687	0.0000	0.968	0.5113	1.022	-0.150	3.089
259SS3	0.2800	0.7200	0.0000	-0.047	1.0332	1.479	0.884	2.675
248SS3	0.3715	0.6285	0.0000	-0.343	1.2686	1.200	0.871	3.230

TABLE 11. continued ...

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
254SS3	0.2461	0.7539	0.0000	0.351	0.7841	1.446	0.196	2.028
256SS3	0.0168	0.9832	0.0000	0.707	0.6124	1.067	0.374	2.290
239SS3	0.0215	0.9634	0.0151	1.467	0.3618	1.320	-0.199	2.165
246SS3	0.1251	0.8749	0.0000	0.342	0.7891	1.157	0.151	2.490
263SS3	0.0672	0.9328	0.0000	0.510	0.7022	1.129	0.440	2.504
242SS3	0.0841	0.9159	0.0000	0.652	0.6366	1.150	0.038	2.308
257SS3	0.1117	0.8883	0.0000	1.026	0.4909	1.258	-0.634	2.701
253SS3	0.0735	0.9265	0.0000	0.663	0.6315	1.146	-0.035	2.844
S353C ME	0.8939	0.1061	0.0000	-1.441	2.7152	0.449	2.751	23.921
S344T ME	0.0577	0.9289	0.0134	1.565	0.3379	1.294	-0.611	3.075
S342T ME	0.1070	0.8930	0.0000	0.983	0.5057	1.256	-0.594	2.752
S341T ME	0.1158	0.8842	0.0000	1.009	0.4967	1.312	-0.494	2.385
S343T MI	0.0541	0.9347	0.0112	1.298	0.4066	1.351	-0.229	2.280
S353T ME	0.0452	0.9465	0.0084	1.442	0.3680	1.190	-0.534	2.972
188SS1	0.0230	0.9686	0.0084	1.979	0.2537	1.129	-1.382	5.583
197SS1	0.0295	0.9642	0.0063	1.435	0.3697	1.398	-0.427	1.974
195SS1	0.0025	0.9912	0.0064	1.506	0.3520	1.082	-0.025	2.421
201SS1	0.0036	0.9862	0.0103	1.448	0.3665	1.225	-0.054	2.102
180SS1	0.0200	0.9749	0.0051	1.843	0.2787	1.181	-1.005	3.473
178SS1	0.0064	0.9858	0.0078	1.053	0.4819	0.931	0.771	3.815
154SS1	0.0550	0.9177	0.0274	1.589	0.3323	1.546	-0.416	2.046
139SS1	0.0025	0.9937	0.0038	0.999	0.5004	1.059	0.580	2.623
138SS1	0.0256	0.9742	0.0002	2.315	0.2010	1.172	-0.896	4.073
161SS1	0.0000	0.9533	0.0467	1.859	0.2756	1.148	0.190	2.391
144SS1	0.0606	0.9242	0.0152	0.764	0.5889	1.566	0.505	1.878
147SS1	0.0026	0.9717	0.0257	1.322	0.4000	1.181	0.669	2.678

TABLE 12. GRAIN SIZE SUMMARY PANGNIRTUNG SAND SHEET -- PLANAR SURFACE

SAMPLE	GRAVEL	SAND	SILT	MEAN (PHI)	MEAN (MM)	STD.DEV. (PHI)	SKEWNESS	KURTOSIS
222SS2T1	0.1522	0.8478	0.0000	0.093	0.9376	1.254	0.785	2.937
351SS2T2	0.4146	0.5854	0.0000	-0.213	1.1588	1.705	0.594	2.188
337SS2T2	0.0560	0.9440	0.0000	0.105	0.9300	0.889	1.008	4.536
392SS2T3	0.1974	0.8026	0.0000	0.547	0.6845	1.531	-0.147	2.066
183SS1	0.0269	0.9692	0.0040	0.299	0.8128	1.085	1.273	4.058
204SS1	0.0159	0.9611	0.0230	1.651	0.3185	1.180	-0.166	2.749
176SS1	0.0184	0.9738	0.0078	1.285	0.4103	1.205	0.015	2.307
174SS1	0.0000	0.9969	0.0031	2.036	0.2438	0.617	0.206	3.429
175SS1	0.0036	0.9875	0.0089	1.442	0.3679	1.113	0.141	2.501
200SS1	0.0000	0.9746	0.0255	2.391	0.1906	0.740	0.206	2.909
186SS1	0.0127	0.9873	0.0000	0.655	0.6349	1.051	0.753	2.953
199SS1	0.0000	0.9991	0.0009	0.828	0.5634	0.943	0.757	2.882
187SS1	0.0016	0.9823	0.0161	1.649	0.3187	1.068	0.023	2.683
189SS1	0.3876	0.6124	0.0000	-0.533	1.4465	1.090	1.576	4.980
202SS1	0.0000	0.9896	0.0104	1.555	0.3403	0.904	0.503	3.281
190SS1	0.0159	0.9841	0.0000	1.092	0.4689	0.857	-0.405	3.180
181SS1	0.0099	0.9779	0.0122	1.683	0.3113	1.064	-0.045	2.869
192SS1	0.1851	0.8097	0.0053	-0.053	1.0371	1.309	1.338	3.755
185SS1	0.0093	0.9900	0.0007	0.757	0.5917	0.780	0.646	4.023
194SS1	0.0327	0.9637	0.0036	1.077	0.4741	1.241	-0.067	2.083
182SS1	0.0107	0.9878	0.0015	0.965	0.5122	1.085	0.305	2.384
371SS1	0.0000	0.9711	0.0289	2.085	0.2356	0.993	-0.013	2.587
356SS1	0.0000	0.9520	0.0480	2.173	0.2217	1.020	-0.011	2.731
379SS1	0.0060	0.9619	0.0321	1.511	0.3507	1.301	0.253	2.052
359SS1	0.0008	0.9050	0.0942	3.018	0.1234	0.703	-0.583	5.630
370SS1	0.0000	0.9884	0.0116	2.268	0.2075	0.875	-0.420	3.358
368SS1	0.0030	0.9519	0.0451	2.154	0.2246	1.069	-0.177	2.779
357SS1	0.0000	0.9987	0.0013	0.495	0.7094	0.745	1.636	6.305
372SS1	0.0000	0.9180	0.0820	2.669	0.1572	0.783	0.205	3.186
374SS1	0.0000	0.9715	0.0285	2.517	0.1747	0.672	0.551	3.102
364SS1	0.0000	0.9832	0.0168	2.812	0.1424	0.565	0.147	2.784
373SS1	0.0000	0.9905	0.0095	1.414	0.3752	1.108	0.467	2.292
355SS1	0.0000	0.9670	0.0330	1.661	0.3162	1.263	0.363	1.892
367SS1	0.0000	0.9582	0.0418	2.589	0.1662	0.682	0.368	3.443
361SS1	0.0000	0.9257	0.0743	2.696	0.1543	0.757	0.169	3.174
365SS1	0.0000	0.9469	0.0531	2.461	0.1816	0.909	-0.018	2.638
148SS1	0.0000	0.9564	0.0436	2.399	0.1896	0.871	0.174	2.491
134SS1	0.0009	0.9834	0.0157	1.115	0.4616	1.179	0.716	2.653
131SS1	0.0000	0.9829	0.0171	1.785	0.2902	0.996	0.204	2.546
160SS1	0.0094	0.9782	0.0124	1.237	0.4243	1.089	0.337	2.909
152SS1	0.0000	0.9919	0.0081	1.275	0.4133	0.873	1.057	4.021
155SS1	0.0370	0.9585	0.0044	0.172	0.8876	1.145	1.483	4.348
157SS1	0.0005	0.9913	0.0082	1.221	0.4288	1.090	0.317	2.472
158SS1	0.0644	0.9340	0.0016	0.080	0.9461	1.021	1.201	4.319
150SS1	0.0005	0.9935	0.0059	1.001	0.4995	0.934	1.062	4.017
153SS1	0.1034	0.8931	0.0035	0.302	0.8110	1.287	0.871	2.872
142SS1	0.0235	0.9752	0.0014	0.489	0.7125	1.047	0.809	3.149
149SS1	0.0000	0.9886	0.0114	1.305	0.4047	0.949	0.449	3.286
162SS1	0.0148	0.9748	0.0103	0.856	0.5525	1.346	0.452	2.134
159SS1	0.0028	0.9840	0.0132	1.035	0.4879	1.204	0.703	2.643

TABLE 12. continued ...

SAMPLE	GRAVEL	SAND	SILT	MEAN (PHI)	MEAN (MM)	STD.DEV. (PHI)	SKEWNESS	KURTOSIS
141SS1	0.0892	0.9108	0.0000	-0.292	1.2244	0.811	1.772	6.669
136SS1	0.0364	0.9497	0.0139	1.170	0.4444	1.291	0.099	2.353
132SS1	0.0000	0.9985	0.0015	0.921	0.5282	0.717	1.176	5.100
140SS1	0.0017	0.9817	0.0165	2.084	0.2358	1.103	-0.583	2.913
143SS1	0.0287	0.9713	0.0000	0.562	0.6775	1.110	0.521	2.449
145SS1	0.0643	0.9329	0.0028	0.387	0.7647	1.152	0.895	3.262

TABLE 13. GRAIN SIZE SUMMARY PANGNIRTUNG CLIMBING DUNE 1 E-W TRANSECT

SAMPLE	GRAVEL	SAND	SILT	MEAN (PHI)	MEAN (MM)	STD.DEV. (PHI)	SKEWNESS	KURTOSIS
39CD1	0.0000	1.0000	0.0000	0.717	0.60840	0.574	1.113	4.263
23CD1	0.0000	1.0000	0.0000	0.351	0.78393	0.458	0.865	5.254
29CD1	0.0070	0.9904	0.0026	0.907	0.53329	0.749	0.846	5.422
36CD1	0.0000	1.0000	0.0000	1.466	0.36187	0.544	0.351	4.145
24CD1	0.0000	0.9985	0.0015	1.096	0.46779	0.727	0.917	4.067
34CD1	0.0008	0.9992	0.0000	0.436	0.73932	0.627	1.351	5.666
32CD1	0.0019	0.9981	0.0000	0.786	0.58007	0.607	0.869	4.448
40CD1	0.0000	1.0000	0.0000	0.440	0.73695	0.559	1.335	5.870

TABLE 14. GRAIN SIZE SUMMARY PANGNIRTUNG CLIMBING DUNE 1 --
N-S UPSLOPE TRANSECT

SAMPLE	GRAVEL	SAND	SILT	MEAN (PHI)	MEAN (MM)	STD. DEV. (PHI)	SKEWNESS	KURTOSIS
25CD1	0.0146	0.9831	0.0024	0.584	0.6669	1.097	0.698	2.780
37CD1	0.1750	0.8137	0.0113	1.309	0.4037	1.663	-0.782	2.448
31CD1	0.0000	0.9935	0.0065	2.119	0.2302	0.701	-0.030	3.459
38CD1	0.0000	0.9997	0.0003	1.155	0.4490	0.689	0.773	3.412
21CD1	0.0000	0.9995	0.0005	1.619	0.3256	0.485	1.076	4.818

TABLE 15. GRAIN SIZE SUMMARY PANGNIRTUNG CLIMBING DUNE 2 E-W TRANSECT

SAMPLE	GRAVEL	SAND	SILT	MEAN (PHI)	MEAN (MM)	STD. DEV. (PHI)	SKEWNESS	KURTOSIS
51CD2T1	0.0000	0.9757	0.0243	2.364	0.1943	0.673	0.746	3.211
52CD2T1	0.0000	0.9956	0.0044	2.167	0.2227	0.633	-0.098	4.627
42CD2T1	0.0007	0.9994	0.0000	1.565	0.3379	0.719	-0.130	3.202
41CD2T1	0.0000	0.9820	0.0180	1.943	0.2601	0.882	0.238	2.748
60CD2T1	0.0026	0.9871	0.0104	1.524	0.3477	0.941	0.254	3.014

TABLE 16. GRAIN SIZE DATA PANGNIRTUNG CLIMBING DUNE 2 -- N-S UPSLOPE TRANSECT

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
43CD2T1	0.0000	0.9128	0.0872	2.851	0.1385	0.663	0.452	3.069
50CD2T1	0.0000	0.9986	0.0015	1.299	0.4064	0.896	0.120	2.778
56CD2T1	0.0000	0.9774	0.0226	2.367	0.1938	0.703	0.578	2.860
55CD2T1	0.0000	0.9947	0.0053	2.686	0.1554	0.431	0.436	3.547
49CD2T1	0.0000	0.9830	0.0170	2.438	0.1845	0.578	0.621	4.078

TABLE 17. GRAIN SIZE DATA PANGNIRTUNG CLIMBING DUNE 3

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
4CD3	0.0019	0.9435	0.0546	2.629	0.1616	0.826	-0.591	4.988
9CD3	0.0000	0.9766	0.0234	2.617	0.1629	0.599	0.068	4.065
19CD3	0.0062	0.9756	0.0181	1.643	0.3201	1.160	-0.015	2.355
8CD3	0.0000	0.9236	0.0764	2.394	0.1903	0.935	0.143	2.807
17CD3	0.0000	0.9875	0.0125	2.479	0.1794	0.676	-0.107	3.010
13CD3	0.0000	0.9399	0.0601	2.748	0.1488	0.675	0.316	3.006
15CD3	0.0047	0.9337	0.0616	2.362	0.1944	1.015	-0.428	3.562
12CD3	0.0000	0.9987	0.0013	0.760	0.5905	0.840	1.043	3.909

TABLE 18. GRAIN SIZE SUMMARY PANGNIRTUNG--LEESIDE VENTIFACT DUNE--CREST

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
64LVD	0.0070	0.9625	0.0305	1.763	0.2946	1.079	-0.026	3.104
269LVD	0.0047	0.9227	0.0726	2.346	0.1967	1.016	-0.238	3.470
83LVD	0.0011	0.9817	0.0172	1.460	0.3635	1.010	0.348	3.157
275LVD	0.0000	0.8963	0.1037	2.544	0.1714	1.008	-0.206	2.786
84LVD	0.0020	0.9481	0.0500	2.294	0.2039	1.010	-0.267	2.964
164LVD	0.0000	0.9917	0.0083	1.696	0.3085	0.768	0.384	3.647
86SC1SA	0.0000	0.9749	0.0251	2.238	0.2119	0.785	0.193	3.151
66SC7	0.0000	0.9324	0.0676	2.521	0.1742	0.884	-0.130	3.213
172SC7	0.0000	0.9392	0.0608	2.177	0.2210	1.040	0.048	2.563

TABLE 19. GRAIN SIZE SUMMARY PANGNIRTUNG -- LEESIDE VENTIFACT DUNE -- INTERDUNE

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
171LVD	0.3644	0.6356	0.0000	-0.639	1.5575	0.872	1.428	5.367
295LVD	0.0289	0.9711	0.0000	1.846	0.2780	1.271	-0.267	2.701
44LVD	0.3198	0.6802	0.0000	-0.184	1.1356	1.150	0.789	2.838
87SC1	0.2914	0.7086	0.0000	-0.624	1.5413	0.688	1.264	5.234

TABLE 20. GRAIN SIZE DATA PANGNIRTUNG--LEESIDE VENTIFACT DUNE--TAIL

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
85LVD-LE	0.0030	0.9837	0.0133	1.466	0.3618	0.966	0.241	3.359
281LVD	0.0000	1.0000	0.0000	1.213	0.4314	0.648	0.489	3.336
89LVD	0.0154	0.9783	0.0064	0.660	0.6326	1.110	0.759	3.130
270LVD	0.0061	0.9417	0.0522	1.708	0.3060	1.224	0.300	2.429
88LVD	0.0795	0.9058	0.0147	0.663	0.6316	1.378	0.555	2.443
82LVD	0.0000	0.9954	0.0046	1.967	0.2558	0.684	0.104	3.513
81SC1	0.0000	0.9913	0.0087	1.817	0.2837	0.817	0.133	3.253

TABLE 21. GRAIN SIZE SUMMARY PANGNIRTUNG- INDIVIDUAL PLANT TRAPPED DEPOSITS

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
14IPTF	0.0000	0.9669	0.0331	1.692	0.3094	1.087	0.378	2.536
5IPTF	0.0000	0.9861	0.0139	1.973	0.2547	0.815	- 0.076	3.590
20IPTF	0.0014	0.9246	0.0739	2.224	0.2141	1.039	0.073	2.731
10IPTF	0.0006	0.9868	0.0126	1.678	0.3125	0.824	0.553	3.511
16IPTF	0.0000	0.9965	0.0035	1.524	0.3477	0.745	0.654	3.371
11IPTF	0.0000	0.9897	0.0103	1.318	0.4011	1.041	0.451	2.632
3IPTF	0.0027	0.9751	0.0222	1.706	0.3065	1.021	0.177	2.882
18IPTF	0.0000	0.9669	0.0331	2.012	0.2478	0.925	0.216	3.007
76IPTF	0.0315	0.9366	0.0319	1.696	0.3085	1.102	- 0.104	3.626
7IPTF	0.0126	0.9593	0.0281	1.623	0.3246	1.271	- 0.257	2.469

TABLE 22. GRAIN SIZE SUMMARY PANGNIRTUNG VEGETATED DUNE CRESTS--SITE 1

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
27MSVDC-	0.0000	0.9831	0.0169	1.252	0.4198	1.025	0.823	3.312
111MSVDC	0.0000	0.9862	0.0138	1.570	0.3367	1.052	0.041	2.616
95MSVDC/	0.0000	0.9328	0.0672	2.370	0.1934	1.096	-0.457	2.827
63MSVDC/	0.0000	0.9758	0.0242	1.821	0.2830	1.150	-0.070	2.263
73MSVDC/	0.0000	0.9172	0.0828	2.128	0.2288	1.261	-0.170	2.235
69MSVDC*	0.0000	0.8778	0.1222	6.458	0.0113	2.906	-2.639	5.247
99MSVDC	0.0000	0.9909	0.0091	0.647	0.6387	1.057	1.332	4.298
61MSVDC	0.0008	0.9803	0.0189	0.942	0.5203	1.170	0.984	3.253

TABLE 23. GRAIN SIZE ANALYSIS PANGNIRTUNG VEGETATED DUNES--INTERDUNE-- SITE 1

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
78MSVDC	0.0000	0.9928	0.0072	2.077	0.2370	0.603	0.661	3.717
90MSVDC	0.0075	0.9906	0.0020	0.249	0.8416	0.898	1.487	5.291

TABLE 24. GRAIN SIZE ANALYSIS PANGNIRTUNG VEGETATED DUNES--LEESIDE--
SITE 1

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
22MSVDC	0.0000	0.9043	0.0957	2.761	0.1475	0.861	-0.305	3.139
117MSVDC	0.0000	0.9760	0.0240	1.729	0.3016	0.980	0.494	2.748
91MSVDC/	0.0000	0.9335	0.0665	2.400	0.1894	1.066	-0.762	3.898
209MSVDC	0.0000	0.9330	0.0670	2.430	0.1856	0.974	-0.216	2.845
72MSVDC/	0.0000	0.9284	0.0716	2.630	0.1615	0.843	-0.108	3.000
378MSVDC	0.0000	0.9914	0.0086	2.003	0.2494	0.690	0.433	3.488
110MSVDC	0.0000	0.9246	0.0754	2.446	0.1835	0.843	0.334	2.986

TABLE 25. GRAIN SIZE SUMMARY PANGNIRTUNG VEGETATED DUNES--WINDWARD--
SITE 1

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
124MSVDC	0.0000	0.9704	0.0296	1.787	0.2897	1.137	-0.034	2.523
79MSVDC/	0.0000	0.9145	0.0855	2.408	0.1884	1.008	-0.042	2.681
96MSVDC/	0.0000	0.9308	0.0692	2.175	0.2214	1.044	0.150	2.577
71MSVDC	0.0000	0.9584	0.0416	2.225	0.2138	1.000	-0.269	3.021

TABLE 26. GRAIN SIZE ANALYSIS PANGNIRTUNG VEGETATED DUNE CRESTS --
SITE 2

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
103MSVDN	0.0000	0.9145	0.0855	2.999	0.1250	0.652	-0.040	3.064
109MSVDN	0.0000	0.9449	0.0551	2.619	0.1628	0.767	0.080	2.885
107MSVDN	0.0000	0.9344	0.0656	2.420	0.1868	0.980	-0.322	3.157
108MSVDN	0.0000	0.9457	0.0543	2.408	0.1884	0.790	0.508	2.988
100SB12	0.0000	0.9375	0.0625	2.690	0.1549	0.753	0.132	2.729

TABLE 27. GRAIN SIZE ANALYSIS PANGNIRTUNG VEGETATED DUNES--INTERDUNE--
SITE 2

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
122MSVDN	0.0000	0.9932	0.0068	1.443	0.3678	0.693	1.308	5.369
106MSVDN	0.0000	0.9649	0.0351	2.164	0.2231	0.764	0.886	3.474
94MSVDNC	0.0000	0.9938	0.0062	1.030	0.4897	0.880	1.166	4.233
130SB12	0.0000	0.9567	0.0433	2.534	0.1726	0.772	0.001	3.295

TABLE 28. GRAIN SIZE ANALYSIS PANGNIRTUNG VEGETATED DUNES--LEESIDE--
SITE 2

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
101MSVDN	0.0000	0.9458	0.0542	2.893	0.1346	0.590	0.209	2.964
98MSVDNC	0.0000	0.9786	0.0214	2.143	0.2263	0.770	0.544	2.934
104SB12	0.0000	0.9262	0.0738	2.657	0.1585	0.855	-0.300	3.194

TABLE 29. GRAIN SIZE ANALYSIS PANGNIRTUNG VEGETATED DUNES--WINDWARD--
SITE 2

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
105MSVDN	0.0000	0.9390	0.0610	2.757	0.1479	0.732	-0.259	3.756
92MSVDNC	0.0000	0.9511	0.0489	2.712	0.1526	0.685	0.210	2.856

TABLE 30. GRAIN SIZE ANALYSIS PANGNIRTUNG -- SMALL VEGETATED DEPOSITS
ON VALLEYSIDE

SAMPLE	GRAVEL	SAND	SILT	MEAN		STD.DEV.	SKEWNESS	KURTOSIS
				(PHI)	(MM)	(PHI)		
277MSVFH	0.0000	0.9274	0.0727	3.029	0.1225	0.593	-0.007	3.939
266MSVFH	0.0000	0.9941	0.0059	2.135	0.2276	0.690	0.125	2.855
282MSVFH	0.0000	0.9655	0.0345	2.488	0.1782	0.693	0.475	3.074
268MSVFH	0.0000	0.9942	0.0058	2.273	0.2068	0.627	0.024	3.199
274MSVFH	0.0000	0.9818	0.0182	2.556	0.1699	0.618	0.029	3.851
267MSVFH	0.0000	0.9585	0.0415	2.541	0.1718	0.700	0.408	3.198
276MSVFH	0.0000	0.9382	0.0618	2.934	0.1308	0.567	0.387	3.303
278MSVFH	0.0000	0.9942	0.0058	2.687	0.1553	0.463	0.050	3.917

CHAPTER 6

PROXIMAL PRODELTA INVESTIGATIONS AT TWO ARCTIC DELTAS: ITIRBILUNG AND CAMBRIDGE FIORDS, BAFFIN ISLAND

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OBJECTIVES

In 1983, weather stations and oceanographic moorings were placed in Itirbilung and Cambridge Fiords (Syvitski et al., 1984). That study was continued in 1985 attempting to address the following objectives:

(1) determine the relationship between wind velocity and fjord circulation near the delta front;
(2) determine the proximal sedimentation rates off each delta;
(3) detect sediment gravity flows by comparing sediment trap data with current meter measurements.

METHODS

In Cambridge Fiord, the 1983 instrumentation was positioned on the active Keel River Delta, whereas the 1985 stations were placed near the inactive and isostatically-raised Cambridge Delta (Fig. 1). In Itirbilung Fiord, the 1983 and 1985 weather station sites are identical, but oceanographic moorings were placed within an active submarine channel in 1985 (Fig. 2). The instrument packages collected data for 41 days at the Cambridge site (compared to 14 days in 1983) and 39 days at the Itirbilung site (compared to 18 days in 1983).

Oceanographic moorings and Aanderaa weather stations were deployed using a Bell Jet Ranger helicopter sponsored by the Polar Continental Shelf Project. The 50 m isobath was located by lead line and marked with a surface float. The oceanographic moorings were laid out and assembled on the delta flats and then lifted via helicopter and gently lowered beside the surface marker buoy. Figure 3 is a schematic of the mooring and equipment used.

The Aanderaa current meters and thermistor chains, and the weather stations, were cycled and recorded on magnetic tape every 10 and 20 minutes, respectively. Data was later massaged using a 0.5 hour filter and averaged over 1 hour. The sediment traps had an aspect ratio of 7:1 with an inner diameter of 12 cm. The magnetic trap configuration is described in Asprey (1984).

Grain size analyses were performed using the methods described in Chapter 8. Moment statistics and frequency plots were generated using program READY (Hackett et al., 1986).

RESULTS

The sediment trap array at Cambridge Fiord was lost in deployment due to a faulty swivel connected to the subsurface float. The thermistor chain in Cambridge malfunctioned and no data was recovered. In Itirbilung Fiord, the thermistor chain recorded temperatures every 3 m within the water column. However, most of the temperatures recorded were values below -2^{o}C and these did not correspond with values recorded within the Aanderaa current meters. These values are consequently not presented here.

Tables 1, 2 and 3 present the Itirbilung sediment trap results. The lower trap contained 3 times more sediment of a sandier nature and with a lower bulk density than the two near-surface traps. The traps contained laminae of alternating silty clay and coarser sands. No attempt was made to correlate the current meter data, i.e. gravity flow events, with the grain size data from the lower trap. Trap sediment was subsampled at regular intervals which may incorporate several or partial depositional events.

Both Itirbilung and Cambridge fjords had a number of up and down wind events, reaching maximum velocities of 13 m s^{-1} (47 km h^{-1}). However, within Cambridge Fiord there is a complex wind pattern that may relate to positioning the station near a Y-junction of valleys, at the fjord head. The up- and down-fjord wind direction designations for Cambridge should therefore be used only as a guide. In Itirbilung, relatively strong and daily land-sea breezes occur and may reflect a katabatic influence. In addition, there are a number of uindirectional wind events that last for a number of days and may represent the passing of storm fronts (Fig.4).

The near-surface (11 m deep) water currents in Itirbilung Fiord range from quiet water conditions to 0.35 m s^{-1} (Fig. 5). A tidal component, although present, has little effect on the major velocity events. These events are correlatable to both up-inlet winds and discharge events: the former is best recognized by a temperature increase (associated with downwelling at the delta front); the latter is best identified in the v component (down-fjord) of the deconvoluted current velocity (Fig. 5).

The deep current meter (2 m above the sea floor) in Itirbilung Fiord, was located within a submarine channel. Mostly very low currents (< 0.1 m s^{-1}) were recorded (Fig. 6) except for 9 gravity flow events best registered on the down-fjord (v) component of the current velocity. Each event lasted between 1 and 5 hours. The maximum current detected was 0.35 m s^{-1}. Two types of events were identified: (1) powerful single events (which may represent coarse-grained delta front chute failures); and (2) weaker multi-events (which may represent retrogressive slide failures of the prodelta muds). Most of the downwelling events identified by temperature fluctuations at the near surface current meter were also registered by the near bottom meter. In addition, each gravity flow event was also associated with a slight bottom water temperature increase (i.e. the bringing down of warm surface water in sediment/water mixtures). The largest gravity flow event was apparently powerful eneough to move the mooring array into deeper (1.6 m) water (the event registered on the pressure sensors of both the shallow and deep current meter). Given a slope of 3^{o}, the possible downslope translation is 31 m.

The near-surface (5 m) current meter at the head of Cambridge Fiord had relatively low velocities (Fig. 8), although some reached 0.16 m s^{-1}. The larger velocities are correlatable with up-fjord wind intensity but with a notable tidal component. Pressure fluctuations after day 254 are not yet reconciled (no similar pressure fluctuations are recorded by the deep current meter: Fig. 9). The deep (1.5 m above the sea floor) current meter measured very quiet water conditions (< 0.1 m s^{-1}). The temperature increased twice and this may reflect downwelling induced by up fjord winds, or deep water renewal events over the inner sill.

ACKNOWLEDGEMENTS

I would like to thank Ken Asprey for helping to get the equipment together and shipped up to the arctic, and Bob Taylor and Jay Stravers for their field support. Donald Clattenburg performed the textural analyses. Dan Praeg assisted in the preparation of the figures.

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Table 1: 1985 Itirbilung sediment trap results

trap depth (m)	height above seafloor (m)	sedimentation rate (kg m^{-2} day^{-1})	bulk density (kg m^{-3})	sand (%)	mud (%)
10	43	0.428	1223.	4.0	96.0
51	1.8	1.225	1021.	41.9	58.1

Table 2: Textural data from 1985 Itirbilung sediment trap bulk samples. See frequency distribution plots (Figure 10).

Trap	Depth (m)	Lab ID	Mean (Ø)	St. Dev. (Ø)	Skewness	Kurtosis	Sand (%)	Silt (%)	Clay (%)
upper	10	3950	6.7	2.4	0.9	2.6	4.0	69.9	24.1
mag.	25	3948	7.0	2.2	-0.1	3.4	6.5	65.1	27.9
lower	51	3951	5.2	2.5	1.3	3.9	41.9	43.6	14.6

Table 3: Textural data from subsamples of the lower (51 m) Itirbilung sediment trap (Table 2). See frequency distribution plots (Figure 11).

Trap subsample* (mm)	Mean (Ø)	St. Deviation (Ø)	Skewness	Kurtosis	Sand (%)	Silt (%)	Clay (%)
0 - 3	7.4	2.7	0.4	1.9	7.9	53.6	38.6
3 - 6	5.8	2.6	0.9	2.8	33.3	46.9	19.8
6 - 9	4.5	2.3	1.8	5.7	60.5	29.7	9.8
9 - 12	5.3	2.8	1.1	3.2	45.2	36.6	18.1
12 - 15	5.1	2.3	1.5	4.4	44.8	42.0	13.2
15 - 18	5.2	2.2	1.6	5.0	31.7	56.2	12.1
18 - 21	5.5	2.6	1.1	3.1	38.6	42.5	18.9
21 - 24	5.5	2.5	1.2	3.5	33.8	49.3	16.9
24 - 27	5.3	2.4	1.4	4.0	36.9	48.7	14.4
27 - 30	4.8	2.4	1.5	4.7	48.6	39.6	11.8

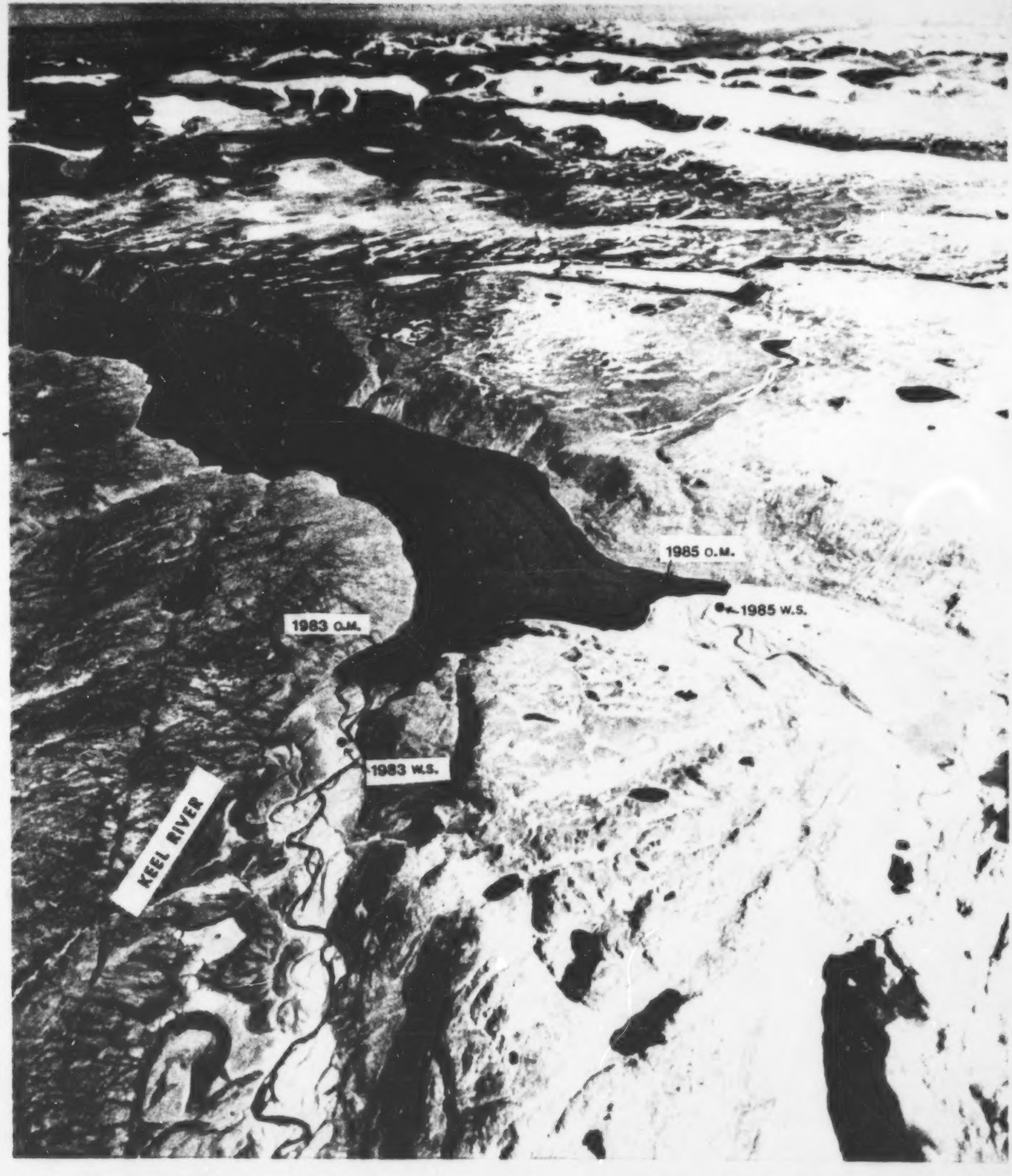
1985 O.M.
1985 W.S.
1983 O.M.
1983 W.S.
KEEL RIVER

Figure 1: Location of the 1983 and 1985 weather stations and oceanographic moorings in Cambridge Fiord, Baffin Island.

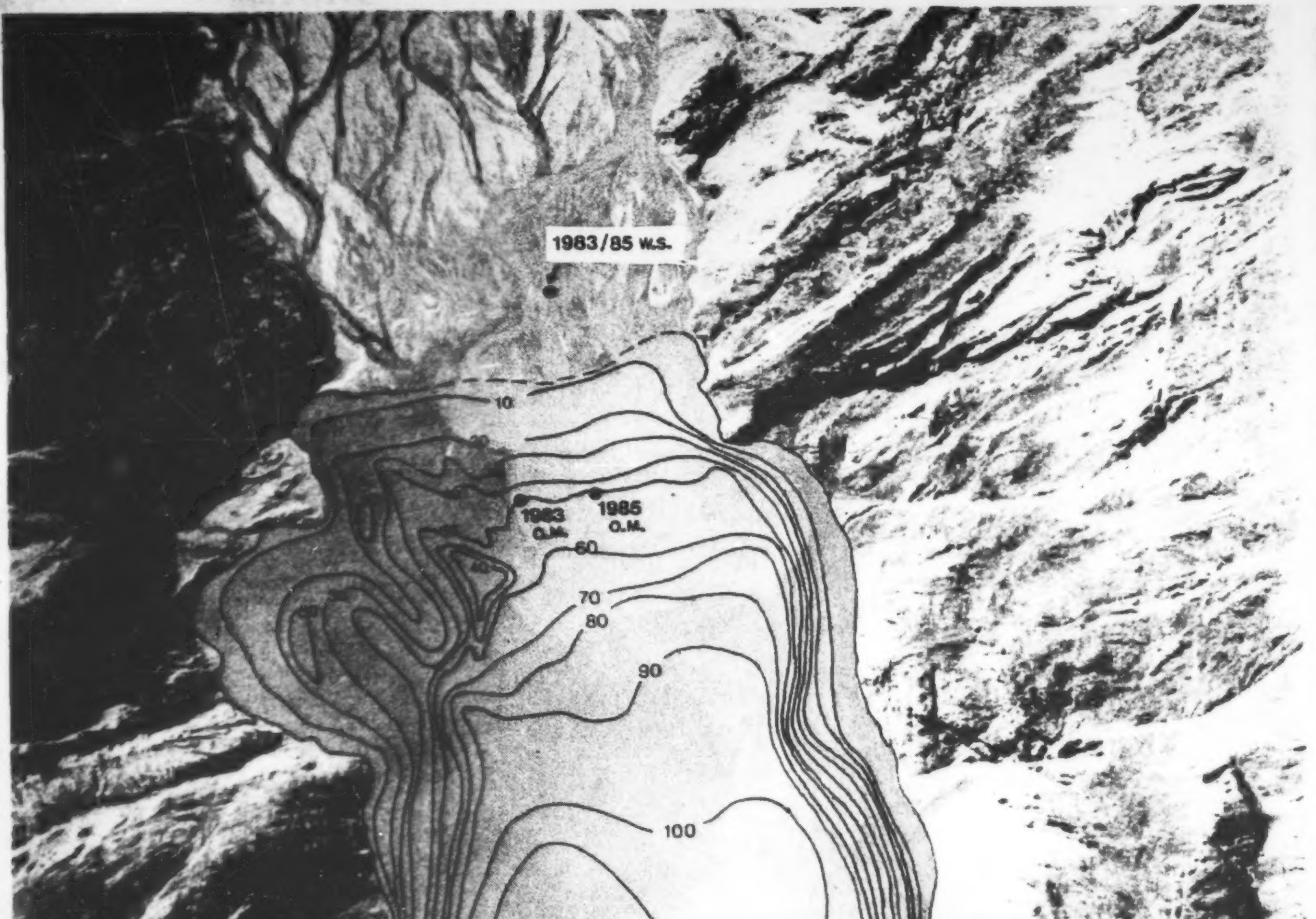
1983/85 W.S.
10
20
1983 O.M.
1985 O.M.
60
40
70
80
90
100
110
120
130
140
70
80
150

Figure 2: Location of the 1983 and 1985 weather stations and oceanographic moorings in Itirbilung Fiord, Baffin Island.

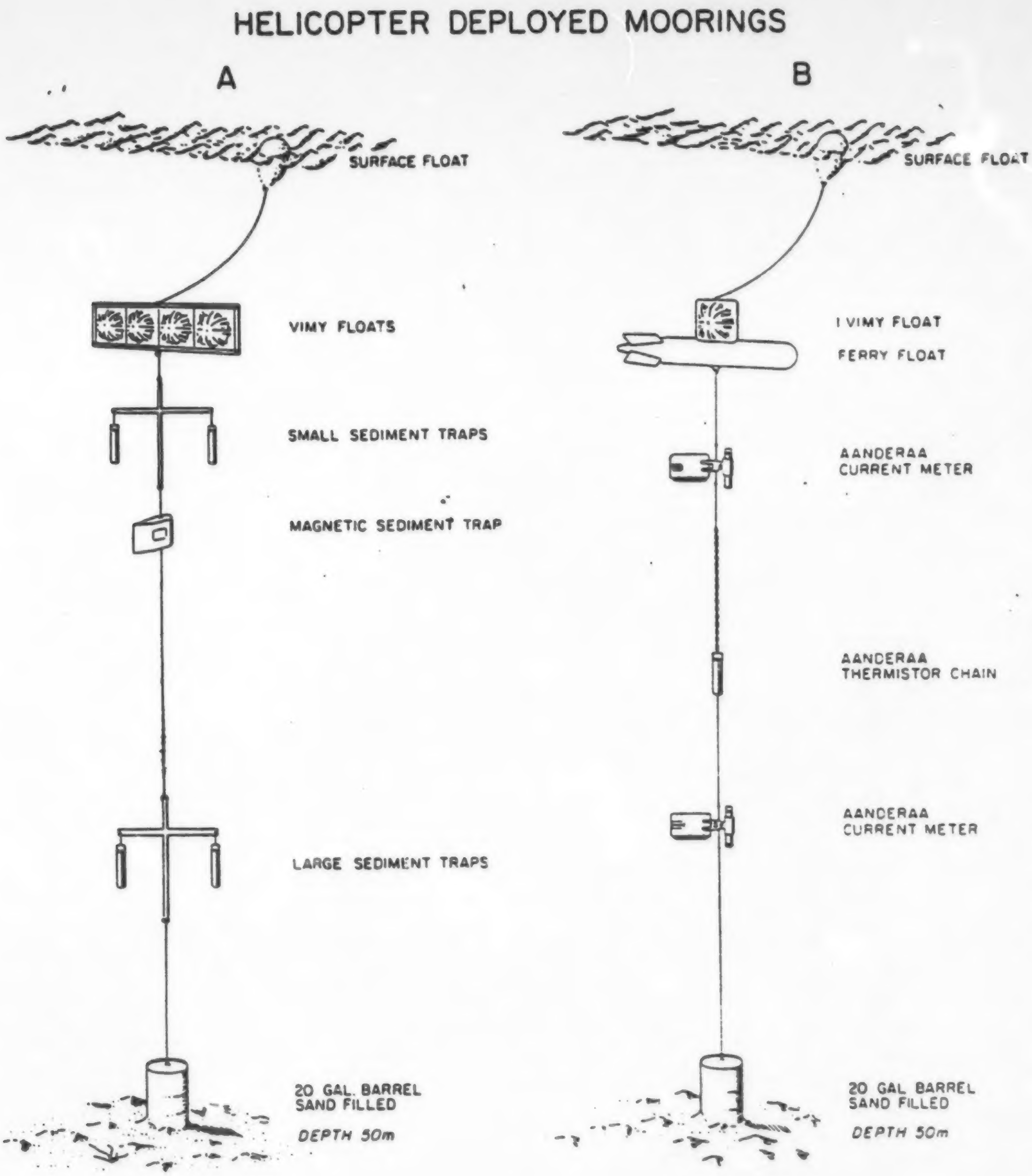
HELICOPTER DEPLOYED MOORINGS
A
B
SURFACE FLOAT
VIMY FLOATS
SMALL SEDIMENT TRAPS
MAGNETIC SEDIMENT TRAP
LARGE SEDIMENT TRAPS
20 GAL. BARREL
SAND FILLED
DEPTH 50m
SURFACE FLOAT
I VIMY FLOAT
FERRY FLOAT
AANDERAA
CURRENT METER
AANDERAA
THERMISTOR CHAIN
AANDERAA
CURRENT METER
20 GAL BARREL
SAND FILLED
DEPTH 50m

Figure 3: Schematic of the oceanographic moorings used in 1985 at Cambridge and Itirbilung Fiords, Baffin Island.

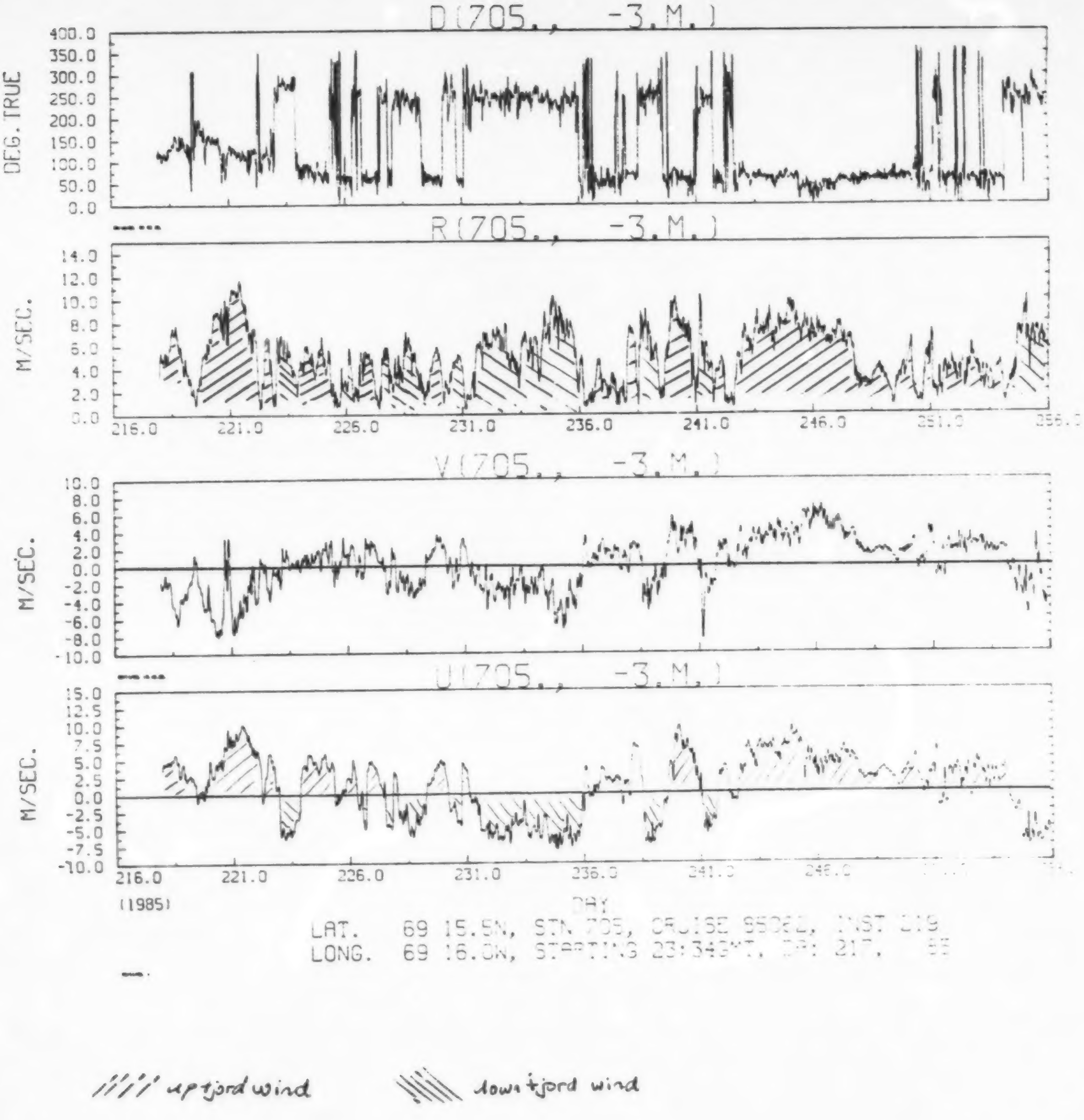

Figure 4: Wind data for the 1985 Itirbilung Fiord weather station. D is the wind direction in true azimuth; R is the wind speed measured 2 m above the ground and 3 m above mean sea level; v and u are the deconvoluted lateral and transverse wind vectors.

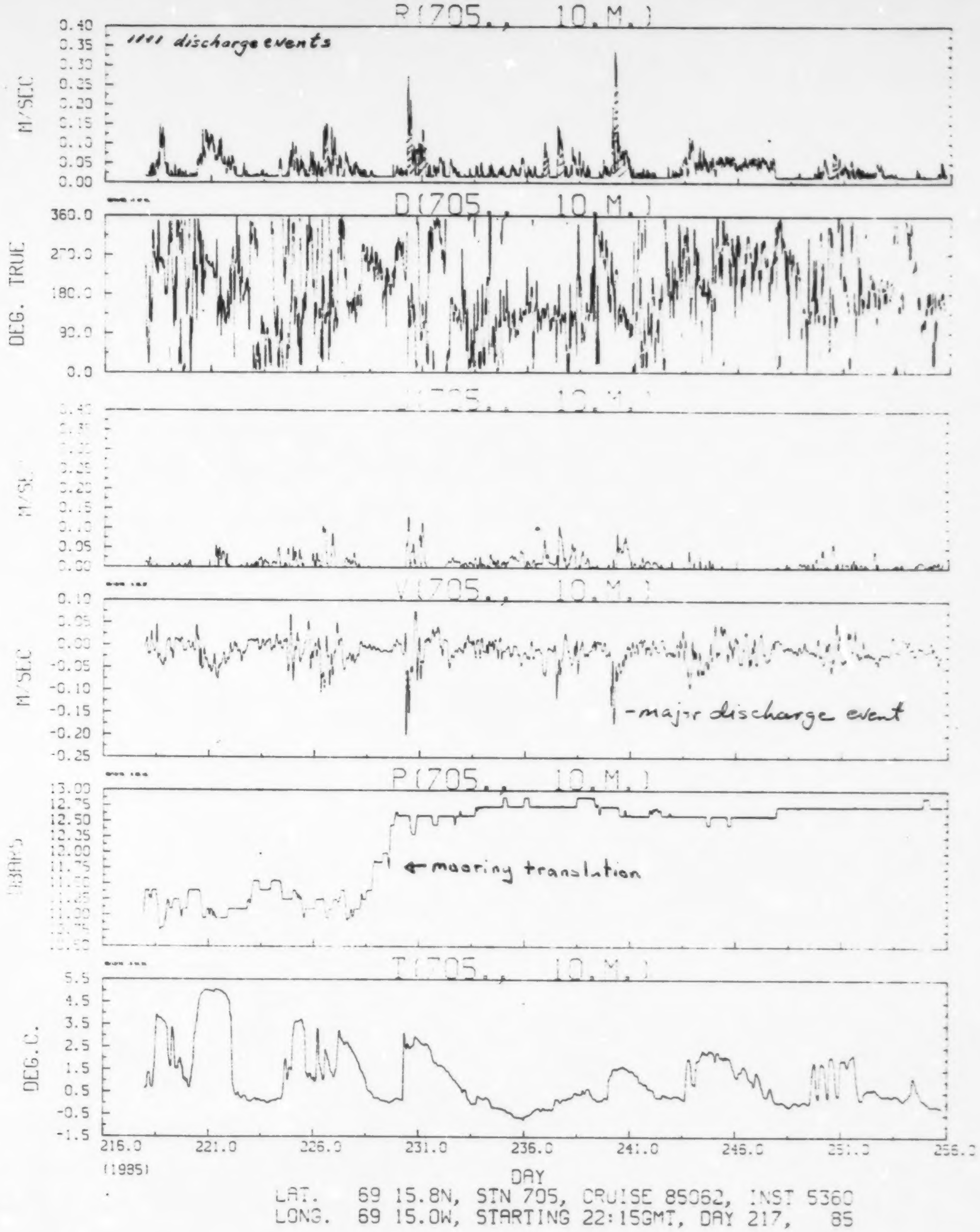

Figure 5: Aanderaa current meter data for the Itirbilung Fiord oceanographic mooring. Meter was positioned 11 m below mean sea level and 42 m above the sea floor. R is the current speed; D is the current direction; v and u are the deconvoluted vector components; P is the water pressure and T is the water temperature.

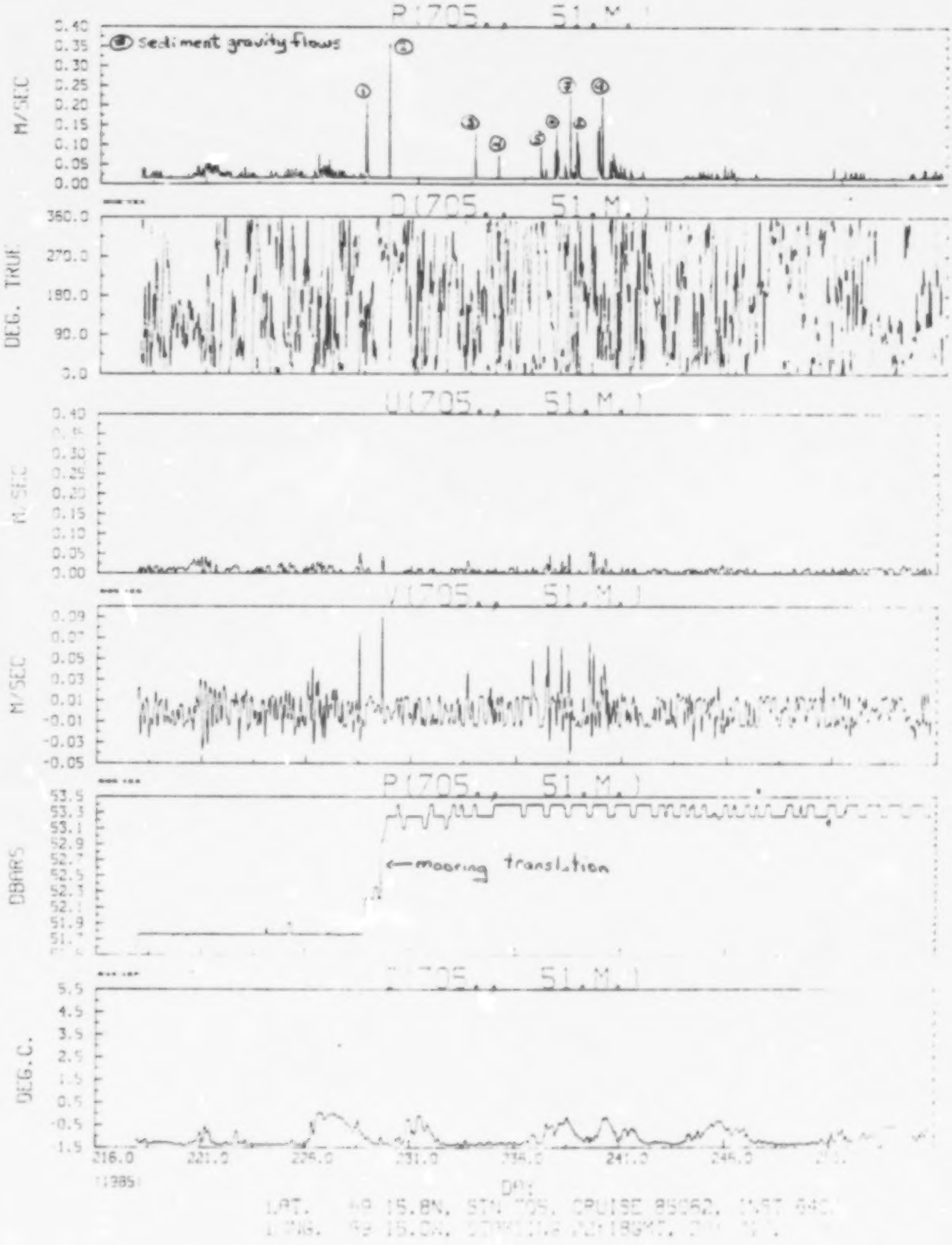

Figure 6: Aanderaa current meter data for the Itirbilung Fiord oceanographic mooring. Meter was positioned 51 m below mean sea level and 2 m above the sea floor. R is the current speed; D is the current direction; v and u are the deconvoluted vector components; P is the water pressure and T is the water temperature.

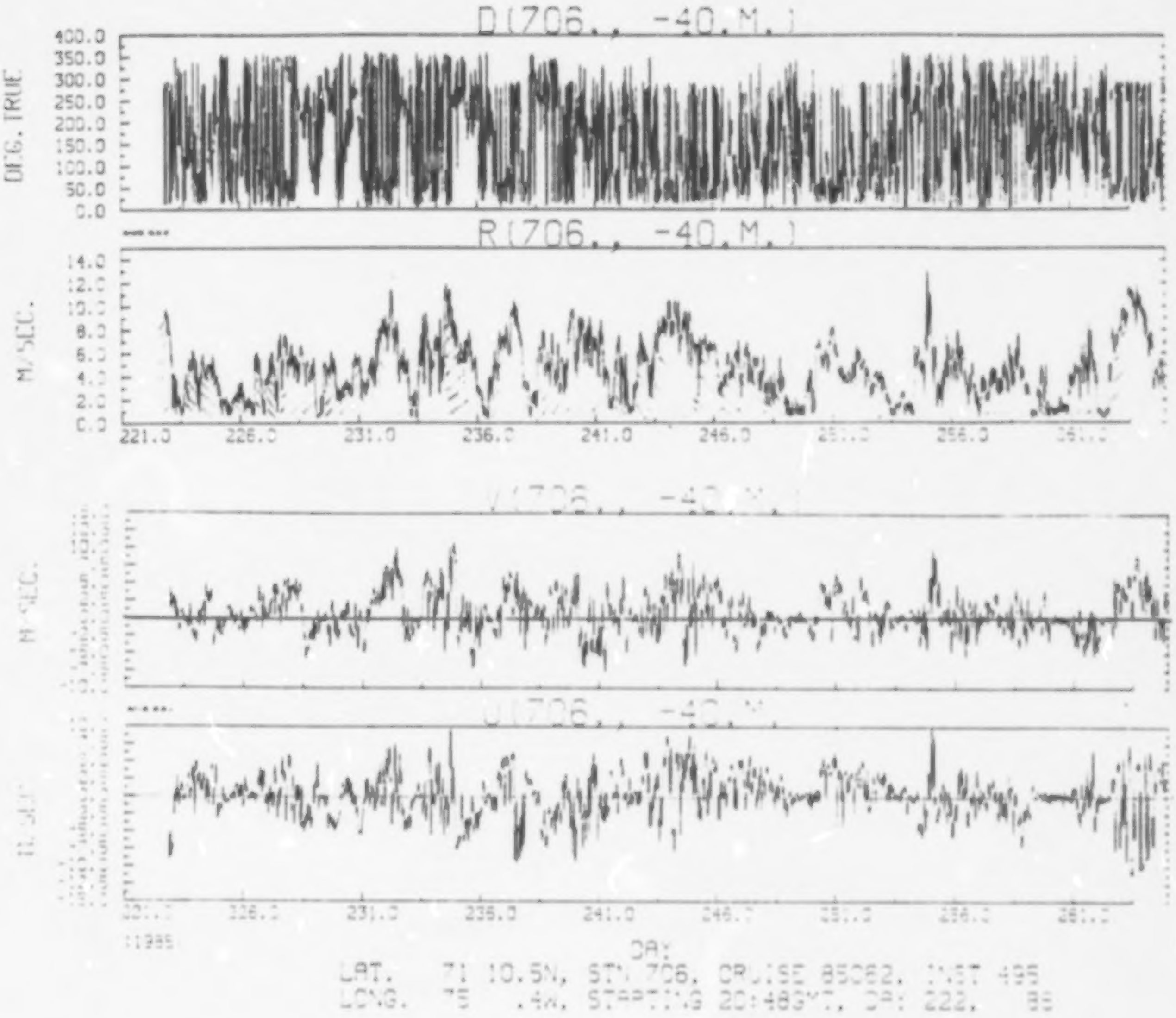

Figure 7: Wind data for the 1985 Cambridge Fiord weather station. D is the wind direction in true azimuth; R is the wind speed measured 2 m above ground level and 42 m above mean sea level; v and u are the deconvoluted lateral and transverse wind vectors.

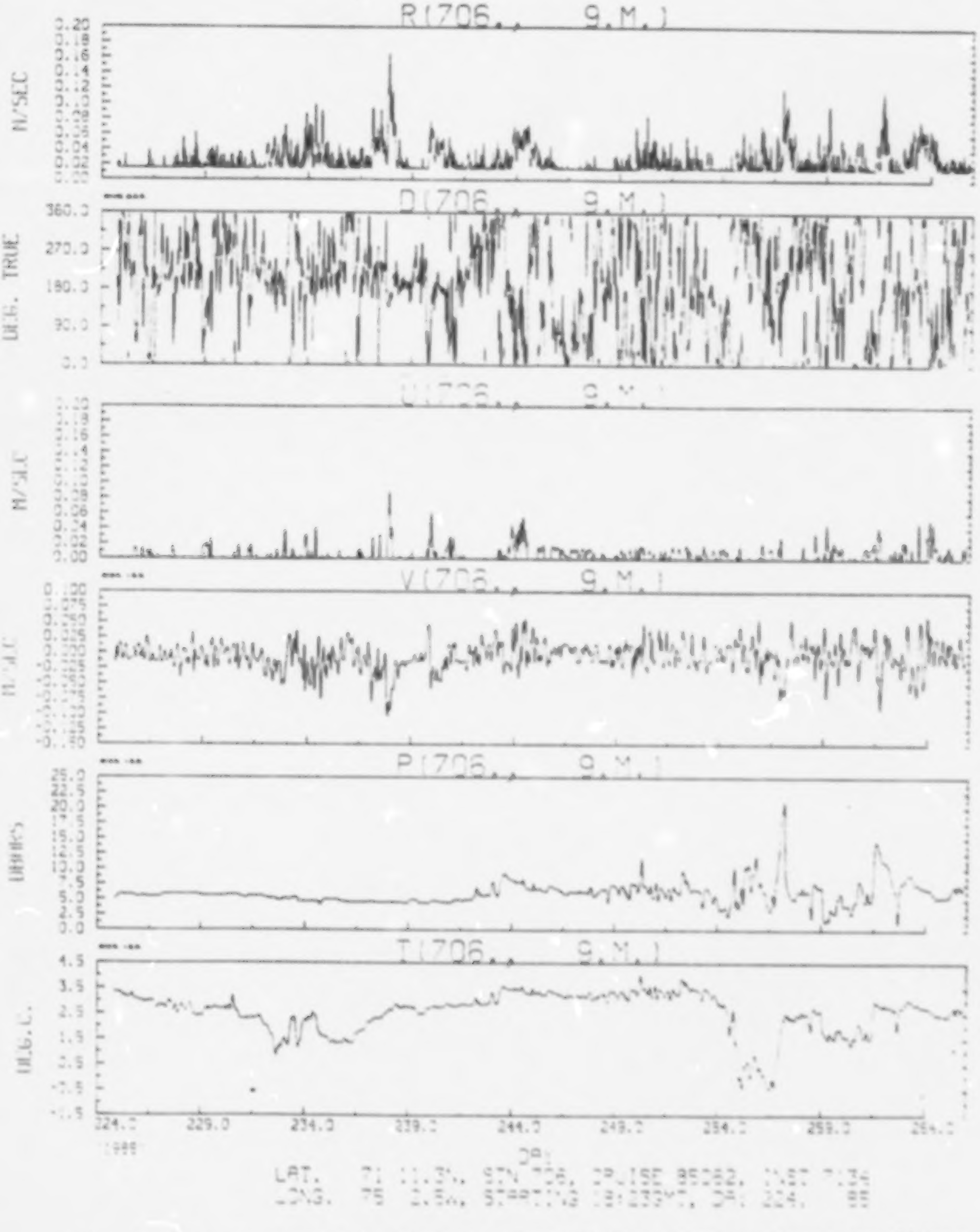

Figure 8: Aanderaa current meter data for the Cambridge Fiord oceanographic mooring. Meter was positioned 5 m below mean sea level and 45 m above the sea floor. R is the current speed; D is the current direction; v and u are the deconvoluted vector components; P is the water pressure and T is the water temperature.

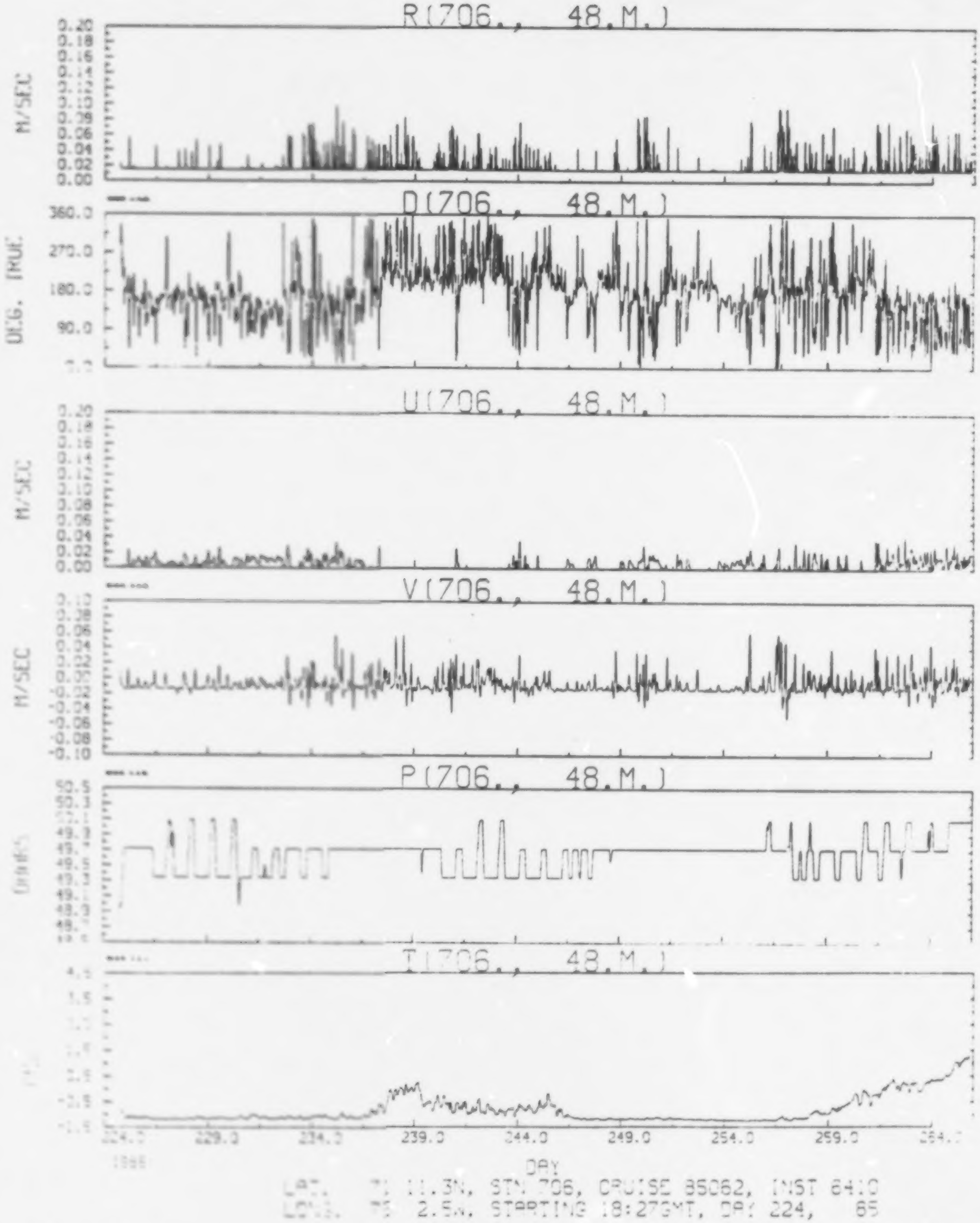

Figure 9: Aanderaa current meter data for the Cambridge Fiord oceanographic mooring. Meter was positioned 49 m below mean sea level and 1.5 m above the sea floor. R is the current speed; D is the current direction; v and u are the deconvoluted vector components; P is the water pressure and T is the water temperature.

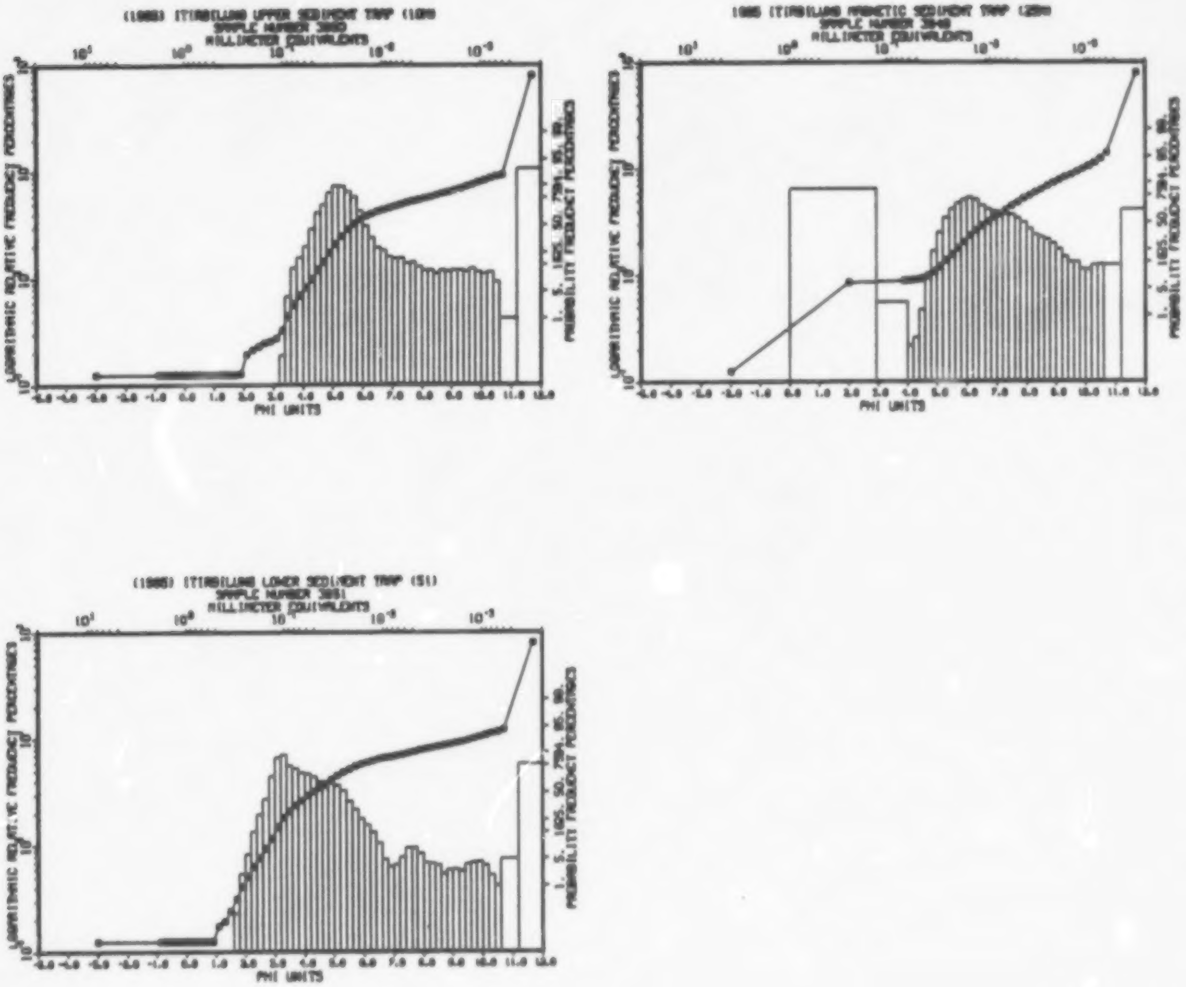

Figure 10 - Grain size frequency distribution plots for 1985 Itirbilung sediment trap bulk samples.

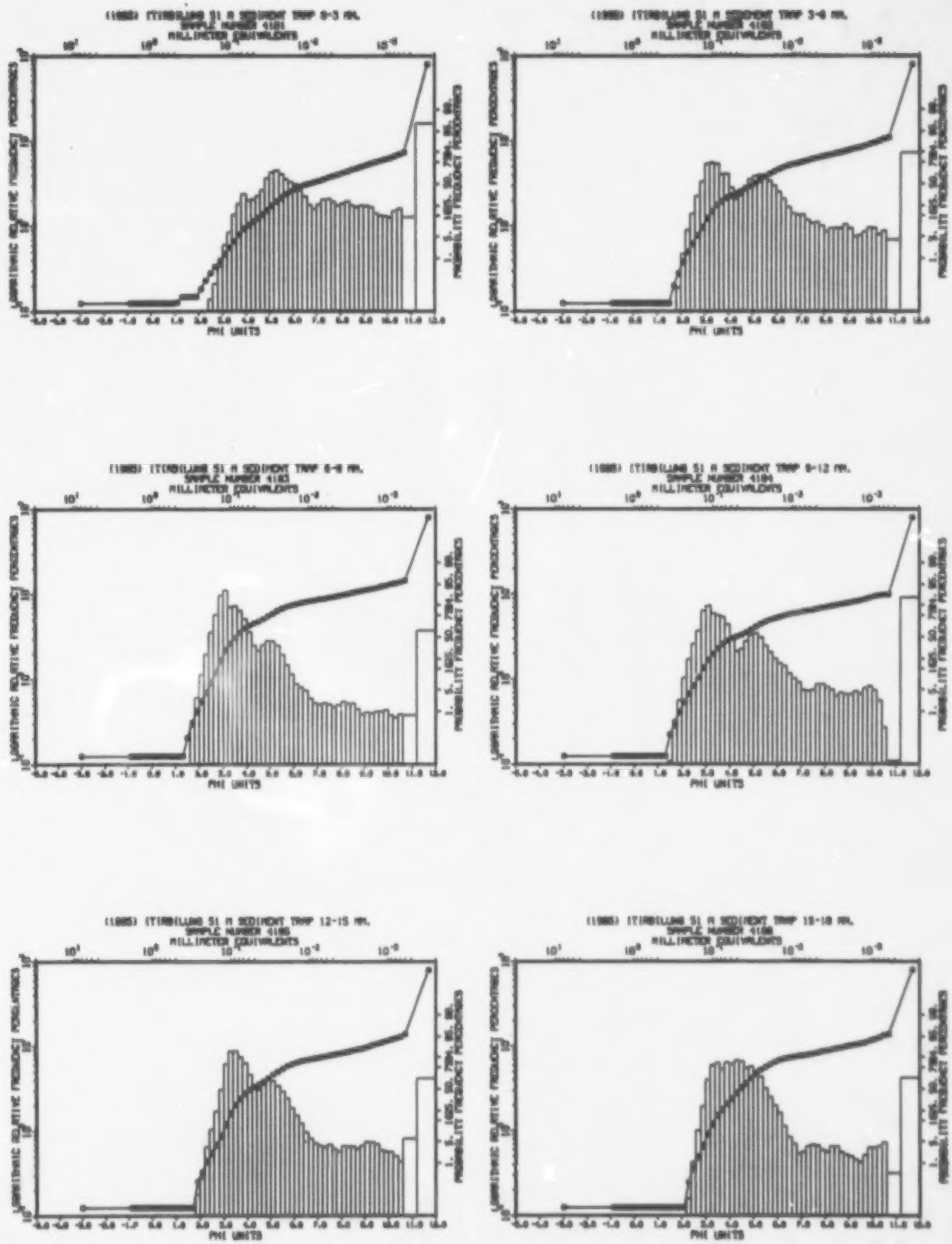

Figure 11 - Grain size frequency distribution plots for subsamples of the lower (51 m deep) Itirbilung sediment trap.

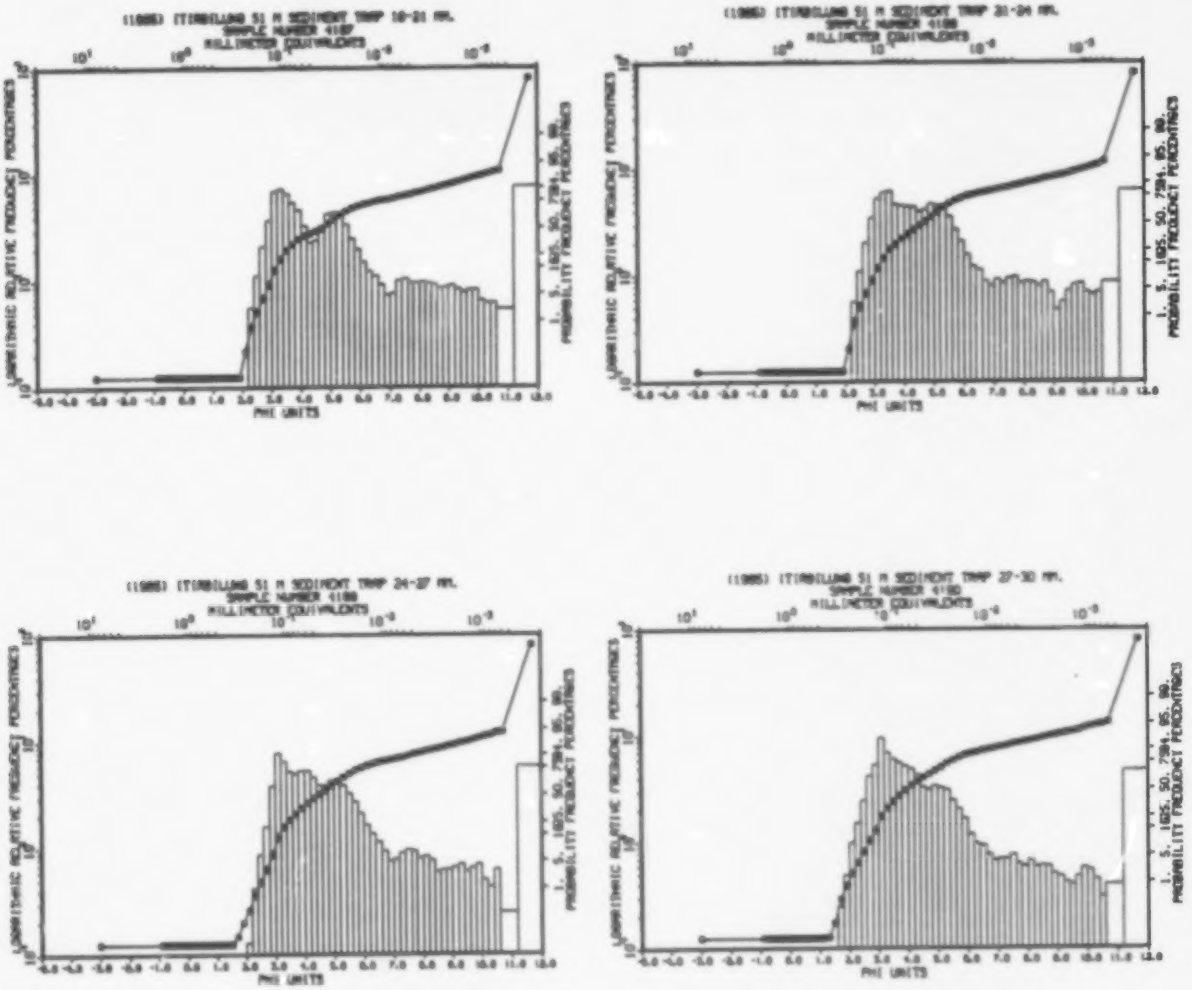

Figure 11 (continued)

CHAPTER 7

SUBMERSIBLE OBSERVATIONS AND OTHER ANALYTICAL RESULTS FROM THE THIRD S.A.F.E. CRUISE

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Purpose:

This report primarily sets out to release manned submersible bottom photographs of the SAFE fjords investigated on expedition PA85-062. This data is a further contribution to the investigation of the benthic environment within (SAFE) arctic fjords, described previously in Farrow (1983), Farrow et al. (1984), Syvitski et al. (1985), Syvitski and Schafer (1986) and Hein and Syvitski (1987).

The submersible PISCES IV was used for a variety of "ground-truthing" missions in 7 Baffin Island fjords (Sunneshine, Maktak, Coronation, Tingin, Itirbilung, McBeth and Inugsuin). Mission goals centered on the inspection of: (1) acoustically reflective outcrops of till-like facies including frontal-dump moraines; (2) morphology of the seafloor adjacent to tidewater glaciers; (3) sedimentation processes, such as the distribution of hemipelagic particles in the water column and observations of induced turbdity currents; (4) characteristics of gravity flow channels and slide feastures on prodelta slopes; (5) sidewall slope environments; (6) the density and diversity of the macrobenthos based on seabed observations of epifauna and of infaunal burrows; (7) the geotecnical characteristics of the seafloor sediment including strength and grain size.

Methods:

Details of the submersible operations and capabilities have been described in Syvitski et al. (1985). Examples of submersible coring, for instance, are shown in Figures 3 & 4. The enclosed photographs were taken from within the submersible with hand-held 35 mm cameras using 200 and 400 ASA slide film. The slides were later converted to B & W prints.

The aeolian sediment samples were analyzed by the AGC soft sediment laboratory using settling tube and Sedigraph techniques (see chapter 8 of this report for a detailed description). The size statistics are given in moment measures of weight percent of equivalent spherical sedimentation dameters.

Results:

Seafloor sediments decreased in grain size with depth: coarsest near the mouths of large rivers and in outerfjord environments where the seafloor currents are strongest. Isolated boulders are ubiquitous, transported by rock slides along the fjord walls or by ice-rafting (sea ice and icebergs).

In outerfjord environments, gravel dumped from icebergs appeared loose and fresh with little to no epilithic habitation; outcrops of till units were more highly compacted and colonized by epilithic species. The seafloor adjacent to tidewater glaciers was comprised of very soft mud (high water content) and the distribution of benthos was grain size dependent, changing from polychaete dominance in the mud to *Macoma* dominance in sandier sediments. Lateral moraines consisted of some very large boulders that were barren of epilithics (Fig. 19). Fronting Coronation glacier, one to three metre high hummocks of folded sediment with 10 to 50 degree slopes were oriented across the major axis of the fjord. The steeper slopes may represent walls of abandoned turbidity channels or isolated slump scars.

The upper 40 to 65 m of the water column lies within the photic zone. Its mean depth is reflected by the presence of *Lithothamnion* algae growth on rocks (Fig. 22), the presence of brown algae on the seafloor mud (Fig. 22), and by Oikopleura floating in the water column (Fig. 1). Stringers of flocculated sediment were observed in the quiter parts of the water column where internal shear forces were absent. Near the seafloor, water turbidity invariably increased, possibly as a result of increased zooplankton (Fig. 2) and benthos activity. The fjord basin benthos was dominated by a variety of polychaetes (Figs. 7 & 9), three species of *Ophiura* (Figs. 7 & 8), sea anemones (Fig. 17), gastropods (Fig. 8), *Alcyonacean* (Fig. 6). crinoids (Figs. 14 & 15), isopods, pycnogonoids, *Gorgonocephalus* (Fig.13) and other starfish, and by a limited number of small eel-like pouts. Six to ten cm diameter cone-shaped depressions that may represent the feeding traces of narwhals(?) were noted on the seafloor near the head of the fjords.

Much of the side wall slope area was barren of sediment (Fig. 21), especially in the outer parts of the fjords (Fig. 24). The particle size of the sediment veneer decreased downslope because of decreasing current energy. Benthos found on these slopes was usually dominated by sea urchins, anemones (Fig. 21) sponges, serpulids, Asteroedea (Fig. 22), shrimp (Fig. 20), shellfish (Fig. 17: *Hyatella arctica, Macoma, Mya truncata, Clinocardium, Serripes* and *Pecten* sp.: Figs. 14, 16 & 23). *Laminaria* occurred in the shallower waters but fragments of this species were observed at all depths. Shell hash was ubiquitous on these slopes (Figs. 14,15 & 23).

That prodelta of Maktak and Itirbilung basins are unstable and characterized by numerous failure surfaces (Figs. 10, 11 & 12). Even on the floors of the turbidity channels slide scars 2 to 3 m high with 35 degree slopes occur commonly.

Aeolian samples were collected at the heads of Coronation and Maktak fjords (Table 2 and Fig. 25). The Coronation sample is typical of glacial loess with its very high silt content. The Maktak samples are more typical of a dune formation.

References:

Farrow, G.E. 1983. Bottom fauna and bioturbation. In: Syvitski, J.P.M. and C.P. Blakeney (comp.) *Sedimentology of Arctic Fjords Experiment: HU 82-031 data report, Volume 1.* Can. Data Rep. Hydrog. Ocean Sci. 12: p. 9-1 to 9-25, 14 pl.

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Hein, F.J. and Syvitski, J.P.M. 1987. Pits on the seafloor. Subm. to Geo-Marine Letters.

Syvitski, J.P.M., C.T. Schafer, K.W. Asprey, G.D. Hodge and R. Gilbert. 1985. Sedimentology of Arctic Fjords Experiment PA85-062 Expedition Report. Geol. Surv. Canada Open File 1234, 79 p.

Syvitski, J.P.M. and C.T. Schafer. 1986. Manned submersible observations and experiments within the fjords of Baffin Island. Abst. 15th Annual Arctic Workshop, Apr. 24-26, 1986, Boulder Co., p. 71-72.

Table 1. Pisces dive information (all stations)

Dive #	Latitude	Longitude	Location	Max. Depth (m)
62-01	66 29.3 N	61 31.2 W	SUNNESHINE	83
62-03	66 35.9 N	62 04.8 W	SUNNESHINE	150
62-05	66 37.8 N	62 03.8 W	SUNNESHINE	245
62-06	67 15.8 N	64 16.1 W	CORONATION	367
62-07	67 14.6 N	64 36.2 W	CORONATION	246
62-09	67 12.5 N	64 46.0 W	CORONATION	92
62-10	67 21.2 N	64 46.8 W	MAKTAK	90
62-11	67 20.4 N	64 41.2 W	MAKTAK	161
62-12	67 19.5 N	64 31.9 W	MAKTAK	246
62-15	68 59.6 N	68 57.6 W	TINGIN	119
62-16	69 01.7 N	68 56.7 W	TINGIN	116
62-17	69 06.2 N	68 53.8 W	TINGIN	320
62-18	69 04.1 N	68 54.4 W	TINGIN	269
62-19	69 16.2 N	69 15.0 W	ITIRBILUNG	85
62-20	69 16.4 N	69 14.5 W	ITIRBILUNG	91
62-21	69 18.7 N	69 07.6 W	ITIRBILUNG	162
62-22	69 19.4 N	68 46.3 W	ITIRBILUNG	393
62-23	69 15.6 N	68 04.5 W	ITIRBILUNG	278
62-25	69 33.3 N	69 55.5 W	MCBETH	182
62-27	69 33.4 N	69 38.4 W	MCBETH	256
62-28	69 33.1 N	69 33.9 W	MCBETH	183
62-29	69 31.3 N	69 19.0 W	MCBETH	417
62-31	70 12.9 N	68 37.7 W	INUGSUIN	280

Table 2. Grain size data from expedition PA85-062 collected aeolian sediment samples (cf. Fig. 25).

Sample ID	Gravel	Sand	Silt	Clay	Mud	Mean	St. Dev.	Skew.	Kurt.	Comments
3993	0.3	23.7	75.5	0.5	76.0	4.55	1.11	-1.4	12.8	Coronation loess
3945	-	99.2	-	-	0.8	2.13	0.51	1.2	5.8	Maktak dune, stoss side
3946	-	99.4	-	-	0.6	2.40	0.44	1.0	5.1	Maktak dune, lee side
3947	-	95.8	-	-	0.6	1.75	1.28	-1.8	7.3	Maktak dune at river cut

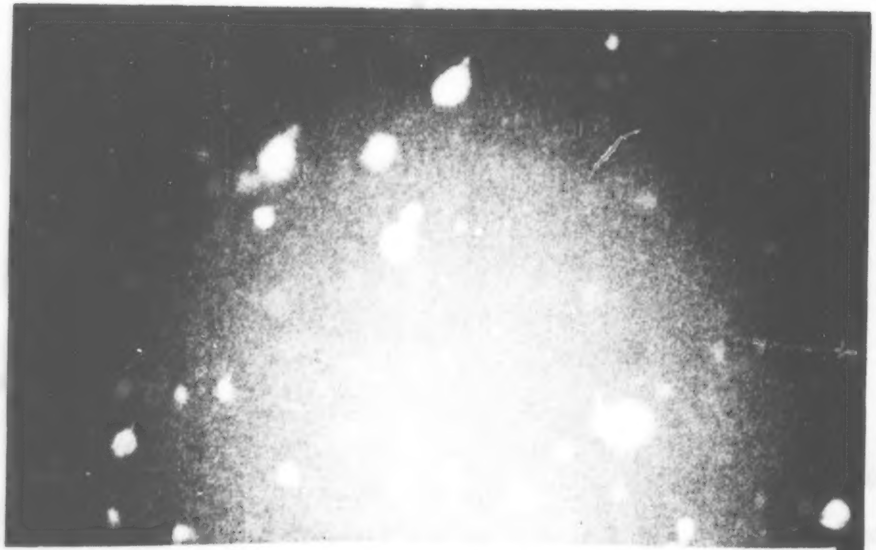

Figure 1. Typical distribution of Oikopleura housings and other suspended matter at a water depth of 70 m: dive 62-18.

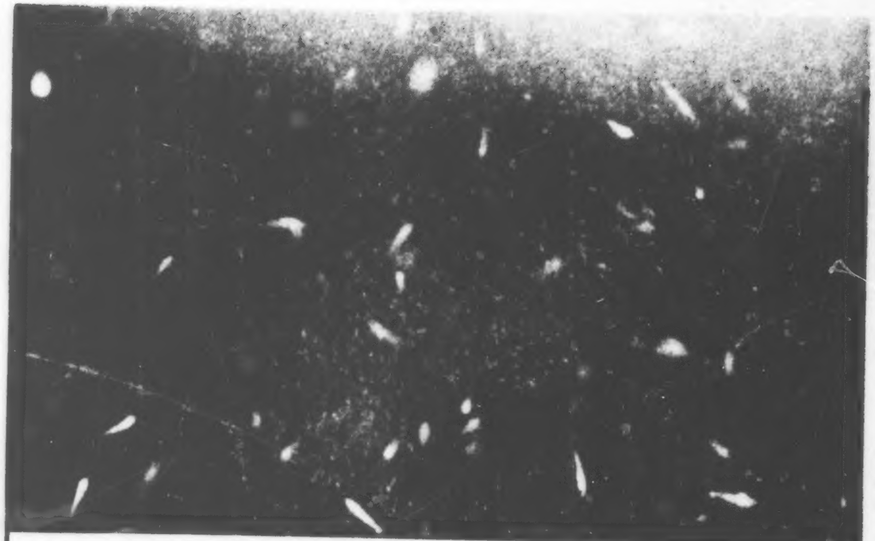

Figure 2. Near-bottom increase in suspended particulate matter and meiofauna (krill) at a water depth of 90 m: dive 62-9.

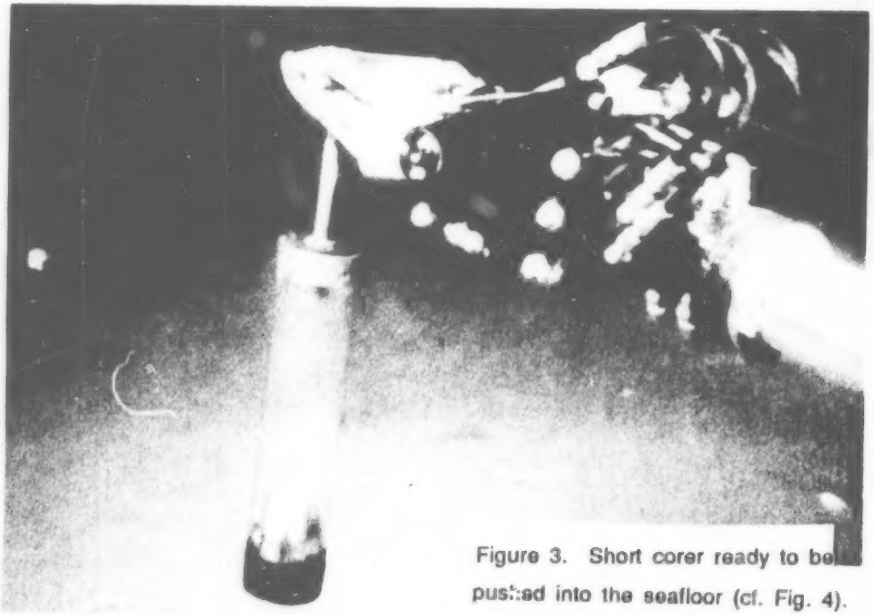

Figure 3. Short corer ready to be pushed into the seafloor (cf. Fig. 4).

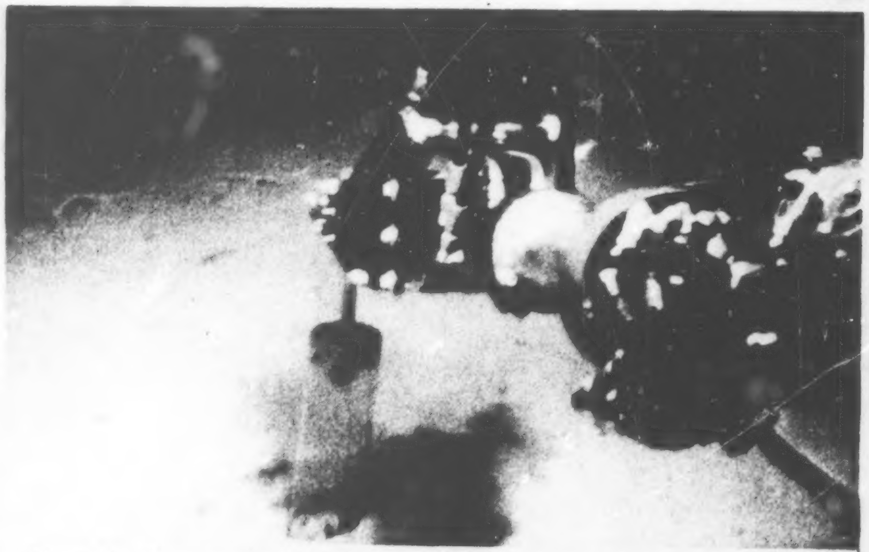

Figure 4. Corer pushed into bottom muds at a water depth of 300 m: dive 62-17.

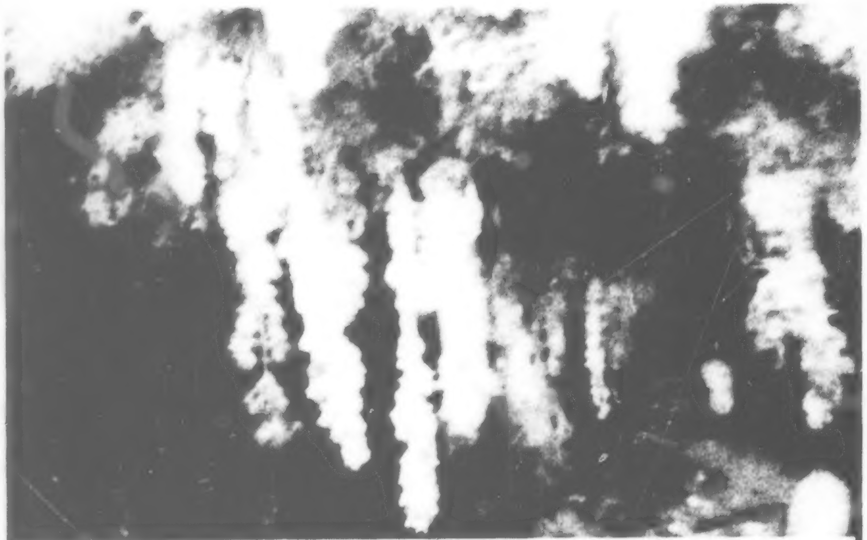

Figure 5. Soft coral hanging from over-hangs cut into the bedrock slopes of Sunneshine Fiord: w. d. ≈ 200 m. dive 62-5.

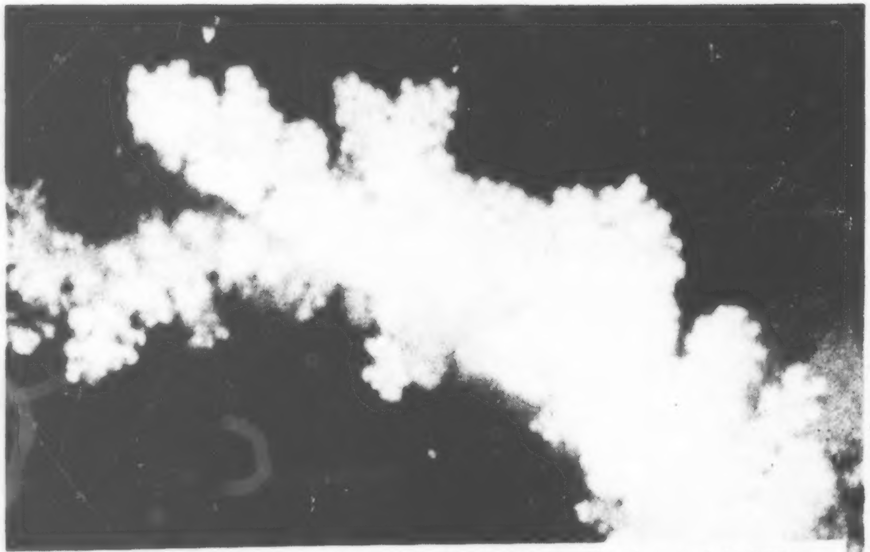

Figure 6. Alcyonacean growing on boulder in Tingin Fiord: ≈ w.d. is 230 m, dive 62-18.

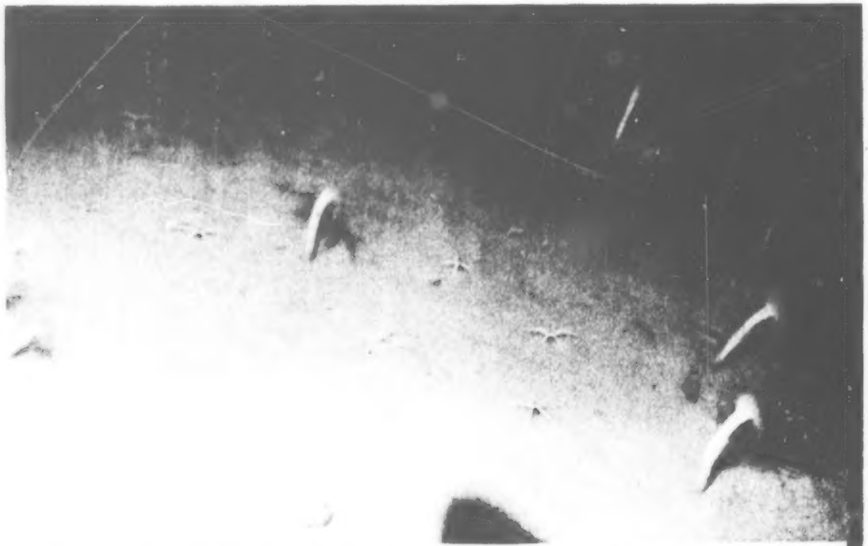

Figure 7. Retractable white polychaetes, brittle stars and urchin on base of sidewall mud slope. Note few burrow openings: w.d. ≈ 190 m, dive 62-18.

Figure 8. Significant infauna based on no. of burrow openings. Note gastropod traces: ≈ w.d. is 245 m, dive 62-27.

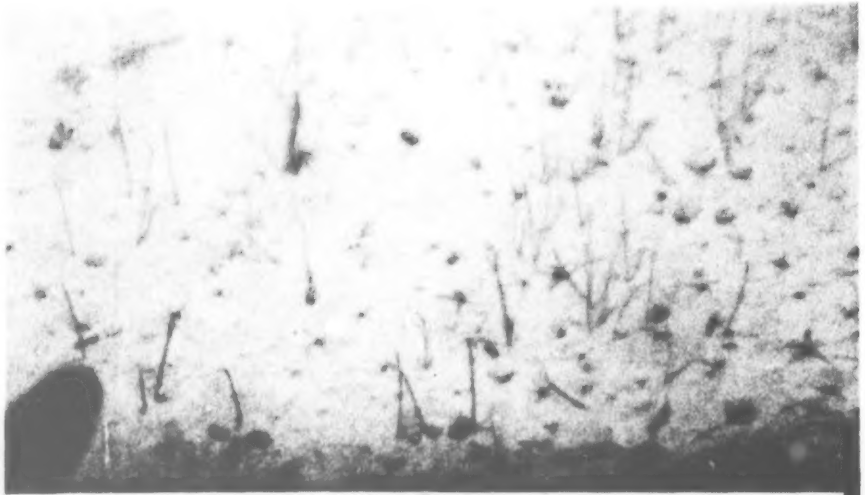

Figure 9. Stable benthic environment of agglutinated polychaetes, scallops and brittle stars, on an interchannel "island" on the Itirbilung prodelta; an environment protected from delta front sediment gravity flows: ≈ w.d. is 60 m, dive 62-20.

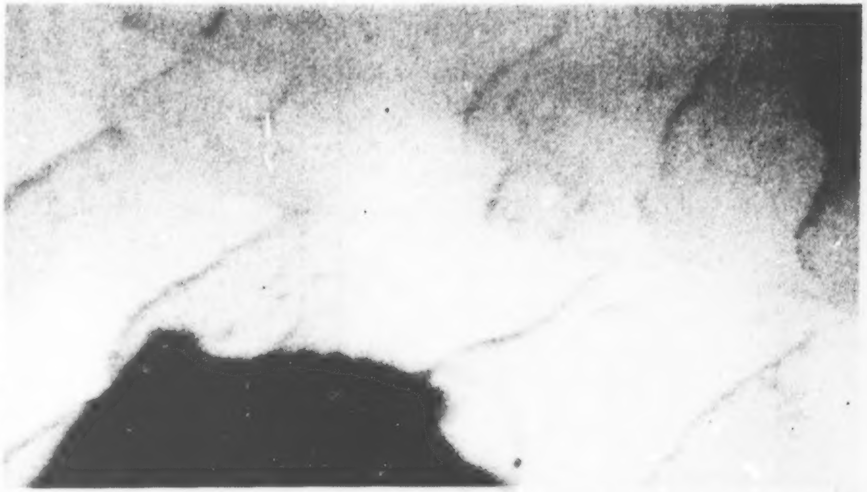

Figure 10. Bedding plane steps of an exposed 3 m high fault scarp trending parallel to the delta front in Itirbilung Fiord. Occuring within an active prodelta channel, the inundation of gravity flows has effectively eliminated all benthos: w.d. = 65 m, dive 62-20.

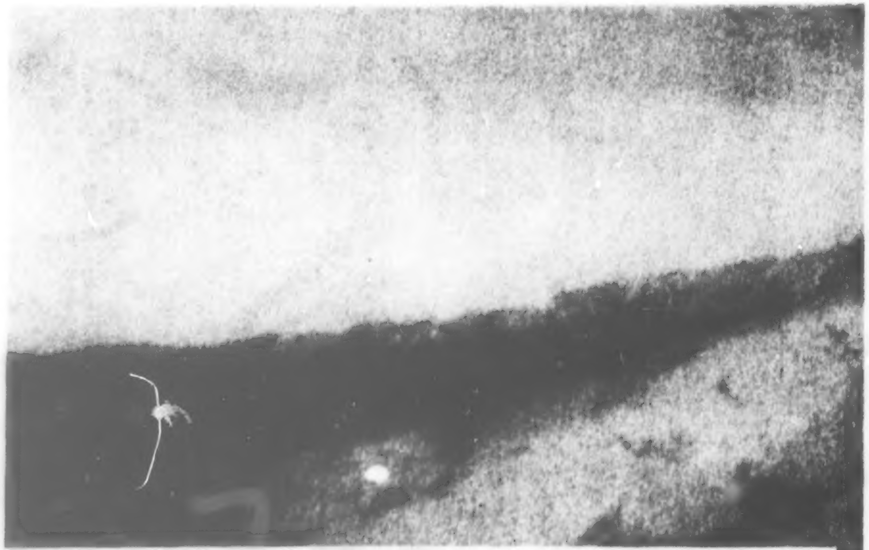

Figure 11. Small (10 cm) scarp along a Maktak prodelta channel wall showing in situ brecciation: w.d. = 58 m, dive 62-10.

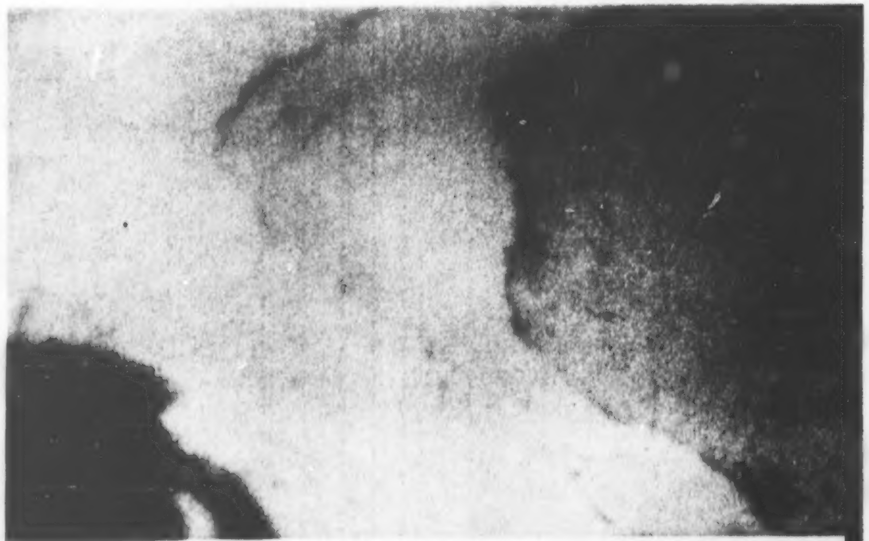

Figure 12. Exposed fault scarp (2 m high) within an active Itirbilung prodelta channel (cf. Fig. 10): w.d. = 70 m, dive 62-20.

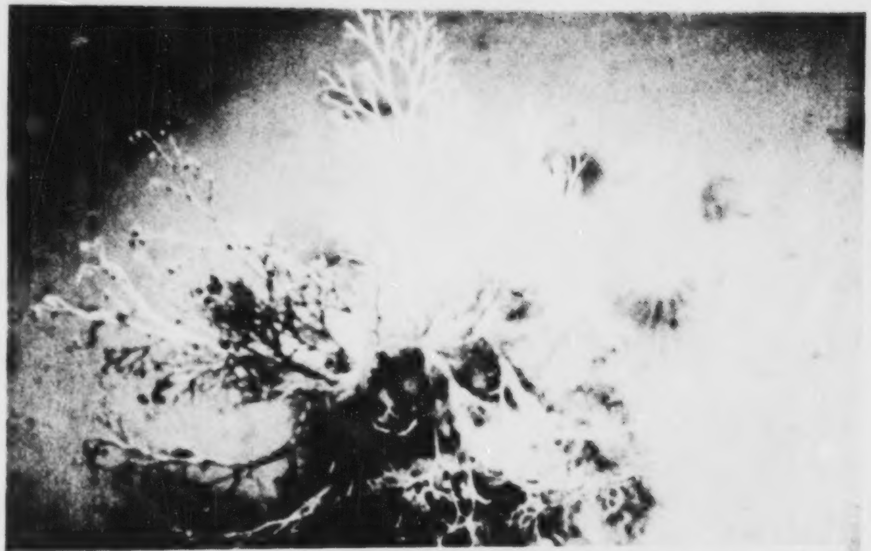

Figure 13. Outstretched basket star *(Gorgonocephalus)*: w.d. = 135 m, dive 62-15.

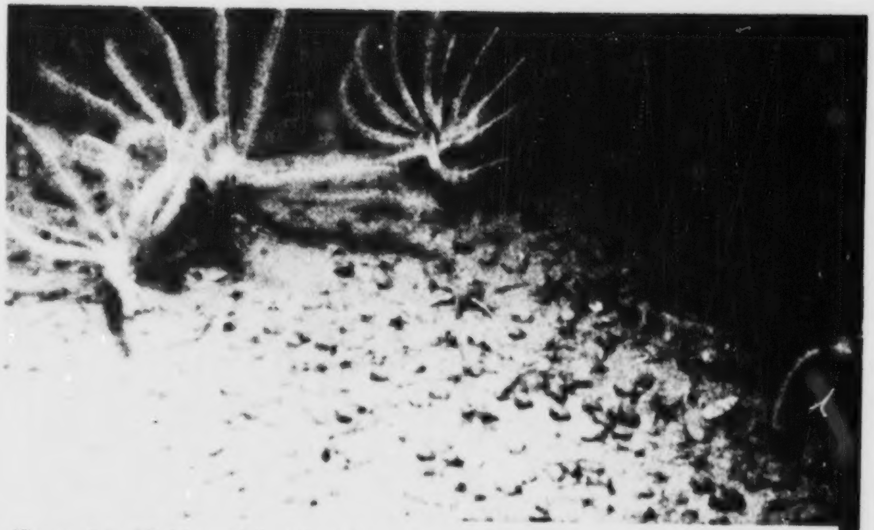

Figure 14. Highly mobile crinoids on steep sidewall slope littered with pectin shells and a few gastropods and brittle stars. Also note *Laminaria* debris in w.d. of 70 m, dive 62-21.

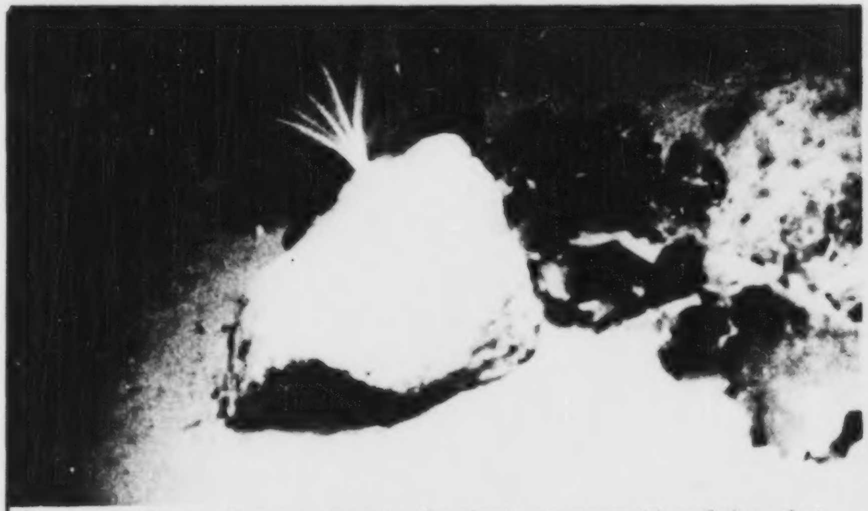

Figure 15. Recent dropstone trapping *Laminaria* on steep sidewall slope that, except for the crinoid, contains no epilithics. The recent mantling of sediment suggests that the boulder was present for weeks to months: w.d. of 60 m, dive 62-21.

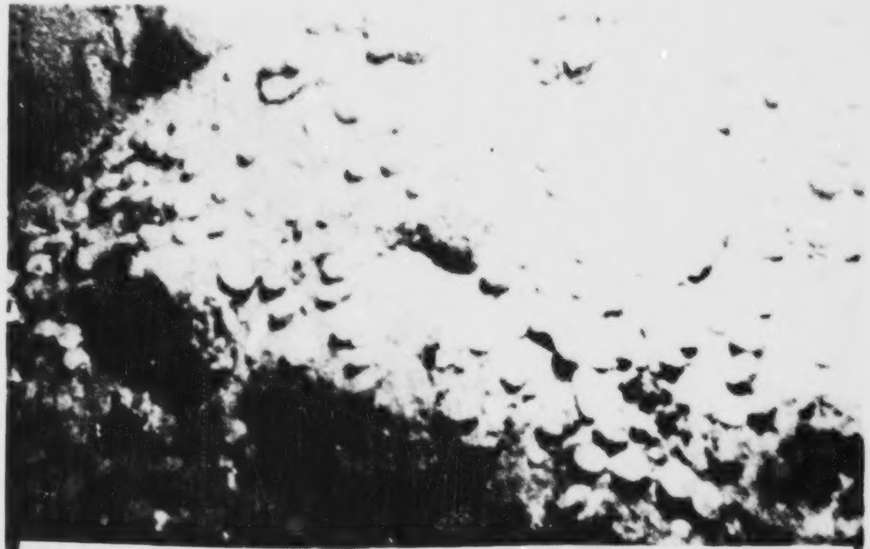

Figure 16. Talus slope infilled with a mud matrix and covered in live scallops: w.d. = 45 m, dive 62-27.

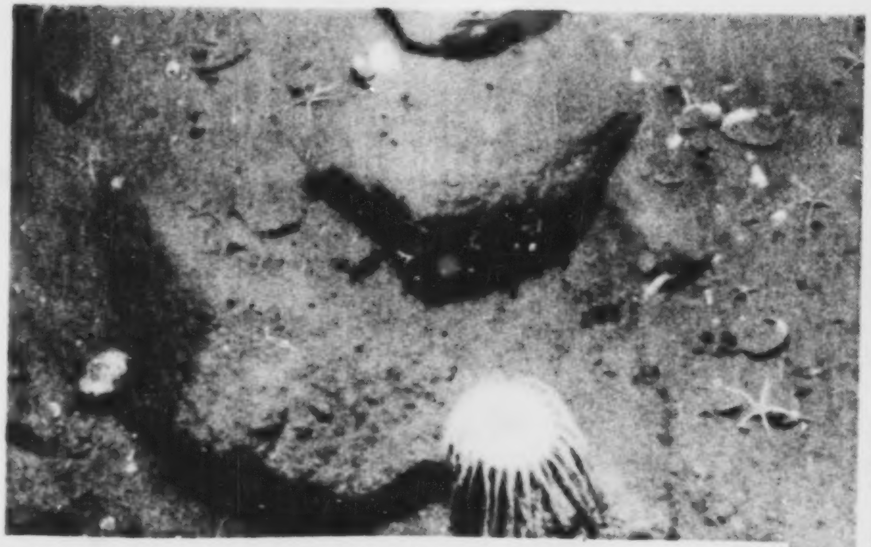

Figure 17. Boulder strewn sidewall in McBeth Fiord. Note the covering of shallow water shell debris that has slid down to a w.d. of 170 m: dive 62-27.

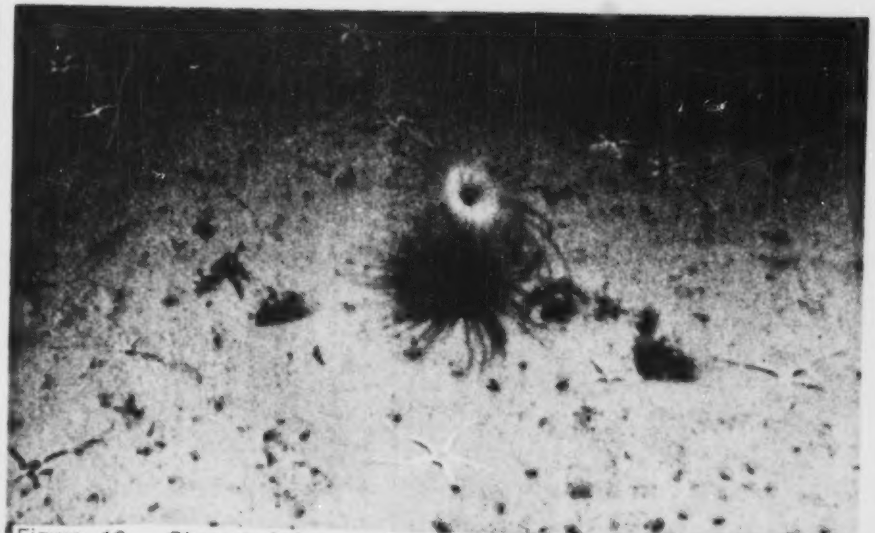

Figure 18. Characteristic prawn openings beside a retractable white polychaete within the mud toe of a steep sidewall slope (cf. Figs. 18 & 19): w.d. = 210 m, dive 62-27.

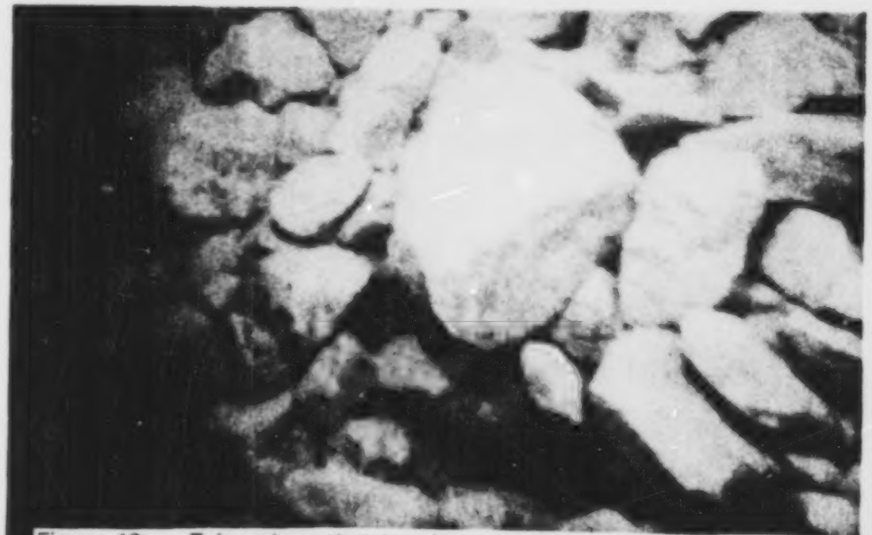

Figure 19. Talus slope that has been emplaced relatively recently---no epilithics, little mud covering by SPM: w.d. = 190 m, dive 62-07. Average rock diameter is 65 cm.

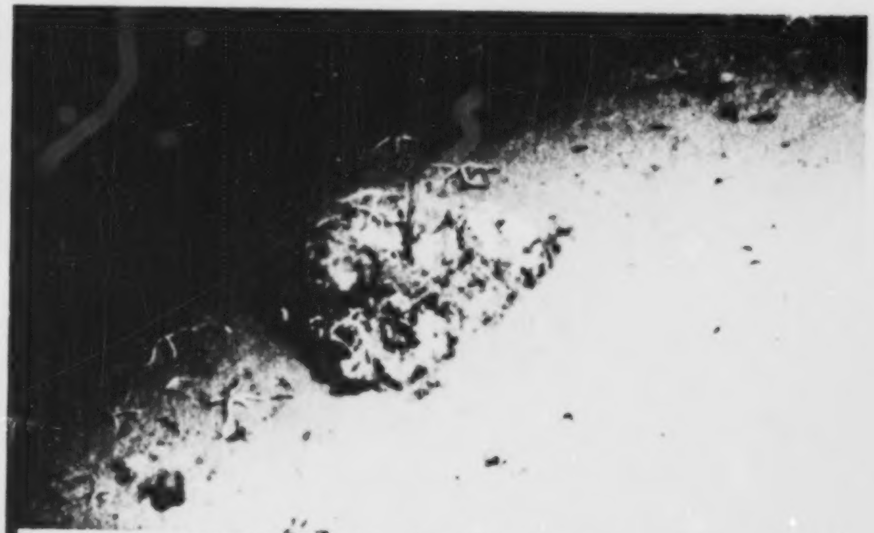

Figure 20. Old dropstone (cf. Fig. 15) with well-established epilithic covering of brittle stars, sponges, serpulids and other polychaetes: w.d 240 m, dive 62-18.

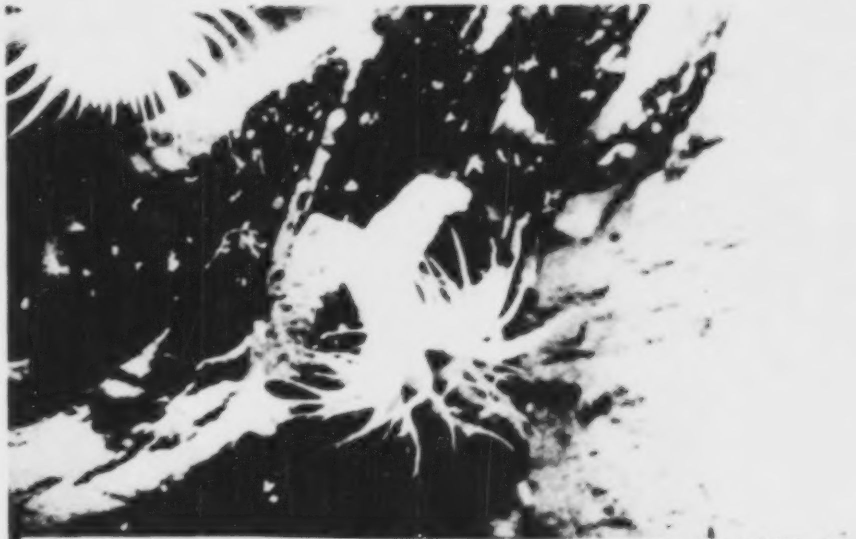

Figure 21. Overhang of bedrock, protected from the vertical rain of SPM, is occupied by solitary corals and two large anemones: w.d.=310 m, dive 62-29.

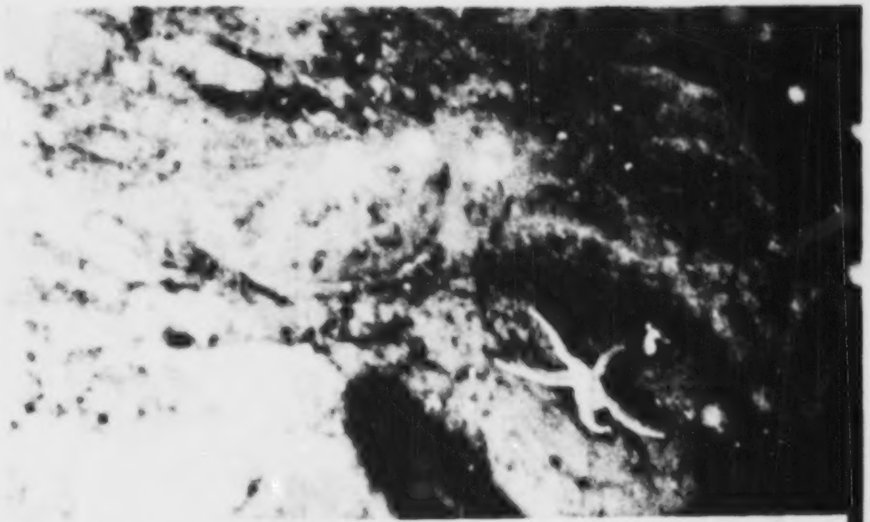

Figure 22. *Lithothamnion* (red algae) and brown algae, indicative of sunlight penetration, covers scattered boulders and mud matrix. Also note starfish for scale: w.d.=45 m, dive 62-18.

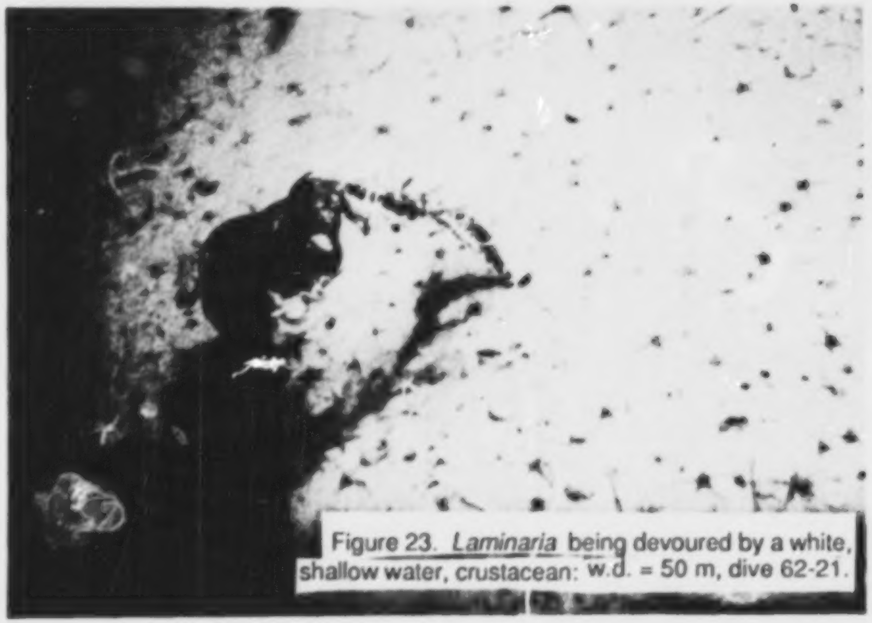

Figure 23. Laminaria being devoured by a white, shallow water, crustacean: w.d. = 50 m, dive 62-21.

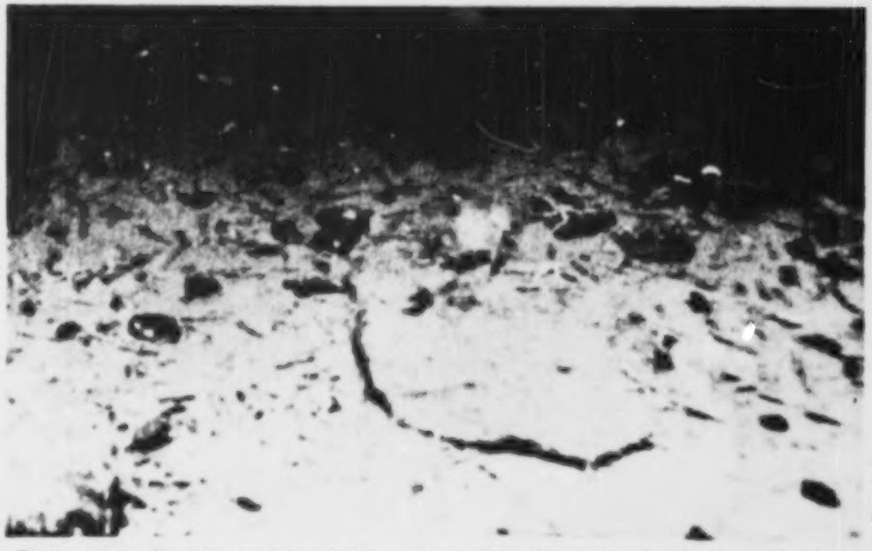

Figure 24. Pebble-boulder field representing the outer fjord sill or shelf environment in Itirbilung Fiord: w.d. 268 m, dive 62-23.

CHAPTER 8

SEDIMENTOLOGIC STUDIES
OF HU82-031 AND HU83-028 PISTON CORES

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OBJECTIVES

This chapter presents the results of grain size analyses and epoxy resin penetration peels available from a total of 12 Benthos piston cores collected during S.A.F.E. cruises HU82-031 and HU83-028 (Table 1). These studies were conducted at the laboratories of the Atlantic Geoscience Centre as part of ongoing programs of research centered around the cores of the S.A.F.E. project. Previous studies of these and other piston cores were presented in S.A.F.E. Data Report Volumes I (Chapters 11-13) and II (Chapters 11, 13-15). Additional data is included in this volume as Chapters 9-13.

GRAIN SIZE ANALYSES

Grain size frequency distributions of 513 selected core subsamples were obtained using a combination of techniques. The gravel fraction was separated from the finer fraction using a standard 2 mm seive, and the sand fraction was separated from the mud using a 53 µm wet seive. Where the sand fraction was greater than 10% of the total sample weight it was analyzed for its equivalent spherical sedimentation diameter at 0.2 ø intervals using the AGC computerized settling tube. Where the mud fraction was greater than 10% it was analyzed for its equivalent spherical sedimentation diameter at 0.2 ø intervals, over the range of 63 µm to 0.5 µm, using a computerized Sedigraph® 5000D. The results of the gravel, sand, and mud analyses were combined using the program MERGE. Details of the AGC sediment analysis procedures can be found in Asprey et al. (in prep). Frequency tables, moment statistics, and frequency plots were generated using the program READY (Hackett et al., 1986).

The major size fraction percentages and moment statistics for 465 piston core subsamples are summarized in Table 2, and frequency plots are attached as Figure 1. For 48 other samples only the initial separation into gravel, >53 µm, and <53 µm was performed; the proportions of these fractions are included in Table 2 as gravel, sand, and mud. Subsamples from core intervals for which epoxy peels were taken are indicated with an asterix on Table 2, and are shown on the peel photographs of Figure 2.

EPOXY PEELS

A total of 16.1 m of Cold Cure® epoxy resin penetration peels were taken from one or more sandy intervals of all cores except CA0.1 and CA1.1. A selected interval of the split core surface was boxed off with cardboard strips, and a mixture of 2/3 epoxy resin and 1/3 hardener was poured directly onto the surface. This highly viscous, hydrophobic mixture penetrated the sandy sediment at a rate proportional to the porosity, and hardened within 24 hours. Once solid, the epoxy permeated sediment was coaxed loose from the core liner, lifted from the remaining sediment, and rinsed. The peels provide information on (1) grain size, which is related to the depth of epoxy penetration, and (2) sedimentary structures, which are defined and preserved in fine detail. The peels provide no information on muddy intervals, as a significant mud content prevents epoxy penetration.

Photographs of the resulting peels are attached as Figure 2, ordered alphabetically by core. It is important to note that only the granular or occasionally gravelly intervals of these peels, often exhibiting sedimentary structures, represent epoxy penetrated sediment. The intervening or adjacent intervals which appear mottled, contorted or striated (e.g. IN-3, 216-382 cm) represent the smooth surface of the epoxy where no sediment penetration was achieved due to significant mud content. The locations of grain size subsamples (Figure1, Table 2) are indicated on the photographs.

REFERENCES

Asprey, K.W., Syvitski, J.P.M. and Clattenburg, D.C.
in prep: Atlantic Geoscience Centre soft sediment lab manual - Part 1. Geological Survey of Canada, Open File Report.

Hackett, D.W., Syvitski, J.P.M., Prime, W. and Sherin, A.G.
1986: Sediment size analysis system user guide. Geological Survey of Canada, Open File Report #1240, 25 p.

TABLE 1

CORE LOCATION INFORMATION

CORE	LATITUDE (N)	LONGITUDE (W)	FJORD	DEPTH (m)	LENGTH (m)
82-031					
CO-2	67°14.1'	64°38.0'	Coronation	248	10.7
IN-1	69°40.8'	69°43.5'	Inugsuin	160	7.2
IN-3	69°48.8'	69°33.0'	"	557	5.9
MA-2	67°19.7'	64°33.6'	Maktak	257	9.8
MA-4	67°18.9'	64°17.0'	"	333	10.1
83-028					
CA0.1	71°13.20'	74°56.00'	Cambridge	70	1.3
CA1.1	71°12.70'	74°59.00'	"	201	7.2
CA1.2	71°12.70'	75°01.00'	"	200	5.5
IT0.1	65°16.20	69°14.40'	Itirbilung	73	2.9
IT0.3	65°17.50'	69°11.0'	"	155	4.3
IT0.4	69°17.90'	69°12.10'	"	155	3.5
IT1.2	69°20.80'	69°01.50	"	293	7.5

TABLE 2 - MAJOR SIZE FRACTION PERCENTAGES AND MOMENT STATISTICS

CORE	DEPTH cm	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KU
CA0.1	4-5	3763	0.16	19.36	80.48	65.79	14.69	5.64	2.34	0.29	3.51
	17-18	3764	0.17	21.00	78.83	64.07	14.77	5.60	2.42	0.44	3.67
	22-23	3765	0.15	7.77	92.08	65.35	26.72	6.71	2.50	0.37	3.11
	37-38	3766	0.00	3.42	96.58	58.75	37.83	7.57	2.46	0.26	2.35
	41-42	3767	0.00	1.91	98.09	53.24	44.85	7.96	2.34	0.12	2.36
	67-68	3768	0.00	7.13	92.87	49.33	43.54	7.69	2.75	-0.16	2.33
	69-70	3769	0.00	8.39	91.61						
	84-85	3770	0.00	2.32	97.68	54.58	43.10	7.84	2.40	0.20	2.16
	107-108	3771	0.00	21.41	78.59	47.78	30.82	6.64	2.82	0.48	2.05
	115-116	3772	0.00	49.25	50.75	34.64	16.11	5.16	2.54	1.26	3.49
CA1.1	10-11	3773	0.00	4.44	95.56	46.67	48.90	7.96	2.38	-0.30	2.93
	45-46	3774	0.00	3.15	96.85	47.00	49.84	8.07	2.32	-0.20	2.81
	53-54	3775	0.00	3.90	96.10	46.56	49.53	8.17	2.52	-0.20	2.54
	90-91	3776	0.00	2.45	97.55						
	140-141	3777	0.00	0.70	99.30	55.94	43.36	8.08	2.16	0.34	2.34
	180-181	3778	0.00	0.46	99.54						
	240-241	3779	0.00	1.28	98.72	41.28	57.44	8.70	2.07	-0.03	2.34
	280-281	3780	0.00	0.32	99.68						
	320-321	3781	0.00	1.40	98.60	32.48	66.12	9.03	2.08	-0.44	3.17
	360-361	3782	0.00	0.43	99.57						
	460-461	3783	0.00	0.32	99.68	40.87	58.81	8.66	2.00	0.02	2.22
	530-531	3784	0.00	0.80	99.20						
	575-576	3785	0.00	1.37	98.63	59.70	38.92	7.74	2.19	0.37	2.56
	590-591	3786	0.00	1.86	98.14						
	618-619	3787	0.00	5.74	94.26	68.17	26.09	6.74	2.31	0.38	3.00
	620-621	3788	0.00	8.76	91.24	61.82	29.43	6.89	2.34	0.57	2.41
	659.5-660	3789	0.00	10.78	89.22	64.92	24.30	6.53	2.29	0.76	2.71
	665-666	3790	0.00	9.48	90.52	73.17	17.35	5.96	2.10	1.29	3.87
CA1.2	3-4	3791	0.00	2.99	97.01	39.68	57.33	8.53	2.26	-0.36	2.94
	20-21	3792	0.00	8.30	91.70	61.74	29.96	6.87	2.51	0.14	2.70
	40-41	3793	1.28	5.51	93.21	54.17	39.04	7.38	2.76	-0.39	3.56
	85-86	3794	0.00	6.18	93.82						
	110-111	3795	0.00	5.03	94.97	64.23	30.74	6.99	2.40	0.33	2.74
	120-121	3796	0.00	4.69	95.31						
	130-131	3797	0.00	7.28	92.72	57.60	35.12	7.22	2.52	0.44	2.06
	156-157	3798	0.00	28.03	71.97	52.90	19.07	5.78	2.47	1.10	3.21
	165-166	3799	0.00	13.93	86.07	59.30	26.77	6.57	2.40	0.69	2.47
	177-178	3800	0.00	22.13	77.87	62.22	15.64	5.69	2.20	1.33	4.03
	190-191	3801	0.00	13.15	86.85	62.23	24.62	6.43	2.44	0.85	2.63
	211-212	3802	0.00	8.90	91.10						
	256-257	3803	0.00	6.95	93.05	62.94	30.11	6.95	2.42	0.65	2.33
	259-260	3804	0.00	66.46	33.54	29.33	4.21	4.03	1.59	3.14	14.12
	285-286	3805*	0.00	61.66	38.34	36.41	1.93	4.01	1.11	3.64	21.53
	288-289	3806*	0.00	5.32	94.68	64.29	30.39	7.00	2.40	0.37	2.73
	298-299	3807*	0.00	56.54	43.46	41.65	1.81	4.06	1.09	3.26	19.34
	305-306	3808	0.00	6.24	93.76	59.36	34.41	7.23	2.52	0.11	2.62
	321-322	3809	0.00	12.10	87.90	55.51	32.39	6.95	2.49	0.44	2.16
	329-330	3810*	0.00	66.65	33.35	31.17	2.18	3.95	1.23	3.22	17.31
	338-339	3811*	0.00	63.32	36.68	34.03	2.65	4.06	1.28	3.29	16.80
	341-342	3812*	0.00	31.05	68.95	53.32	15.63	5.46	2.39	1.48	4.13
	344-345	3813*	0.00	56.38	43.62	39.87	3.75	4.22	1.44	3.00	13.85

*subsample from interval of epoxy resin penetration peel; see Figure 2.

TABLE 2 con't

CORE	DEPTH cm	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KU
	347-348	3814*	0.00	42.84	57.16	51.40	5.75	4.54	1.69	2.21	8.82
	367-368	3815*	0.00	18.34	81.66	56.22	25.44	6.37	2.59	0.71	2.49
	382-383	3816*	0.00	68.56	31.44	26.39	5.05	3.73	1.92	1.97	7.61
	386-388	3817*	0.00	67.30	32.70	28.67	4.03	3.83	1.66	2.09	8.74
	395-396	3818*	0.00	11.15	88.85	58.47	30.38	6.86	2.49	0.34	2.39
	406-408	3819*	0.00	60.59	39.41	35.41	4.00	4.00	1.58	2.03	8.41
	407-410	3820*	0.00	61.50	38.50	32.64	5.87	3.97	1.99	1.78	6.56
	435-436	3821	0.00	8.47	91.53	67.37	24.16	6.50	2.24	0.83	2.78
	450-454	3822*	0.00	32.20	67.80						
	460-461	3823*	0.00	12.64	87.36	59.99	27.36	6.61	2.44	0.69	2.46
	472-473	3824*	0.00	58.88	41.12	38.50	2.62	4.03	1.26	2.38	11.04
	485-487	3825*	0.00	48.36	51.64	46.80	4.84	4.45	1.48	2.58	10.42
CO-2	10-11	3038	0.00	1.09	98.91	49.78	49.13	8.21	2.33	0.08	2.02
	20-21	3039	0.00	1.95	98.05						
	30-31	3040	0.05	1.77	98.18	46.05	52.13	8.33	2.39	-0.07	2.14
	40-41	3041	0.17	4.46	95.36						
	60-61	3042	0.13	4.28	95.59	38.80	56.79	8.45	2.63	-0.47	2.63
	80-81	3043	0.00	2.48	97.52						
	120-121	3045	0.26	4.52	95.22	50.28	44.94	7.76	2.67	-0.03	2.39
	134-135	3046*	0.12	1.27	98.61	38.60	60.01	8.77	2.38	-0.38	2.64
	136.5-137.5	3047*	0.00	61.18	38.82	31.09	7.73	4.25	2.14	1.88	6.49
	137.5-138.5	3048*	0.00	69.73	30.27	25.69	4.58	3.95	1.73	2.61	10.83
	149-150	3049*	0.11	2.84	97.05	39.87	57.18	8.53	2.50	-0.44	2.76
	151-152	3050*	0.00	68.79	31.21	26.19	5.02	3.80	1.86	2.16	8.77
	180-181	3051	0.00	16.81	83.19	35.53	47.66	7.58	3.11	-0.23	1.92
	186-187	3052	0.10	5.88	94.02	42.79	51.23	8.08	2.81	-0.47	2.81
	212-213	3053	0.00	0.45	99.55						
	218-219	3054	0.00	0.60	99.40	44.71	54.69	8.50	2.24	-0.01	1.97
	250-251	3055	0.00	5.47	94.53	54.88	39.64	7.46	2.56	0.29	1.93
	280-281	3056	0.00	1.05	98.95						
	286-287	3057	0.00	14.46	85.54	68.33	17.21	5.93	2.21	1.17	3.65
	310-311	3058	0.00	2.41	97.59						
	323-324	3059	0.00	35.49	64.51	49.79	14.72	5.26	2.35	1.44	4.20
	340-341	3060*	0.00	1.74	98.26	39.72	58.54	8.69	2.45	-0.30	2.20
	350-351	3061*	0.00	6.39	93.61	42.70	50.91	8.04	2.80	-0.33	2.28
	364-365	3062*	0.00	76.39	23.61	19.97	3.64	3.39	1.73	2.58	11.45
	402-404	3063	0.12	23.47	76.41	64.99	11.42	5.28	2.06	1.43	5.39
	408-409	3064	0.00	78.22	21.78	17.46	4.32	3.48	1.79	2.56	10.74
	410-412	3065	0.00	89.16	10.84	7.29	3.55	2.06	2.06	2.56	10.32
	466-467	3066	0.00	25.15	74.85	66.97	7.88	5.03	1.71	2.20	7.97
	471-472	3067	0.00	83.30	16.70	13.43	3.27	3.30	1.60	2.90	13.44
	482.5-483.5	3068	0.00	41.83	58.17	44.11	14.06	5.12	2.39	1.53	4.35
	485-486	3069	0.00	88.12	11.88	8.63	3.25	2.85	1.74	2.99	13.67
	490-491	3070	0.39	1.87	97.75						
	499-500	3071	0.00	1.20	98.80	27.77	71.03	9.24	2.32	-0.65	2.41
	502-503	3072	0.40	49.45	50.15	31.44	18.71	4.57	3.41	0.60	2.61
	516-517	3073	0.09	45.75	54.15						
	524-525	3074	0.09	42.91	57.00	33.44	23.56	5.35	3.33	0.50	2.17
	530-531	3075	0.00	9.31	90.69	40.85	49.84	7.96	2.77	-0.30	2.23
	540-541	3076	0.98	36.61	62.41	36.09	26.32	5.64	3.37	0.29	2.31
	570-571	3077	0.21	39.26	60.53	35.47	25.06	5.57	3.25	0.48	2.22
	585-586	3078	0.05	41.70	58.25	34.19	24.06	5.45	3.26	0.55	2.20

TABLE 2 con't

CORE	DEPTH cm	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KU
	606-607	3079	0.00	47.47	52.53	33.56	18.97	5.09	3.01	0.84	2.69
	612-613	3080*	0.00	1.57	98.43	40.57	57.86	8.64	2.35	-0.28	2.30
	619-620	3081*	0.00	55.95	44.05	35.67	8.38	4.40	2.13	1.87	6.44
	623-624	3082*	0.00	77.21	22.79	18.74	4.04	3.70	1.61	2.94	12.82
	626-627	3083*	0.00	88.95	11.05						
	629-630	3084*	0.00	85.62	14.38	10.84	3.54	2.98	1.77	2.68	11.63
	634-636	3085	0.54	4.49	94.97	34.18	60.79	8.59	2.63	-0.83	3.82
	658-659	3086	0.17	1.97	97.85						
	663-664	3087*	0.00	67.47	32.53	28.90	3.63	3.89	1.52	2.68	12.34
	667-668	3088*	0.00	69.50	30.50						
	673-674	3089*	0.00	83.34	16.66	14.10	2.57	3.22	1.49	2.96	14.71
	677-678	3090*	0.00	82.95	17.05	13.79	3.26	3.06	1.74	2.52	11.18
	682-683	3091*	0.43	80.26	19.31	16.27	3.04	3.21	1.73	1.99	10.30
	689-690	3092*	0.00	76.50	23.50	19.10	4.40	3.51	1.82	2.37	9.88
	696-697	3093	0.00	1.59	98.41	38.81	59.60	8.71	2.31	-0.31	2.43
	714-715	3094	0.00	1.99	98.01						
	720-721	3095	0.00	45.86	54.14	49.70	4.44	4.42	1.57	2.05	8.72
	724.5-725.5	3096*	0.00	79.25	20.75	17.78	2.96	3.42	1.53	2.79	13.11
	727-728	3097*	0.00	3.26	96.74	42.53	54.21	8.33	2.51	-0.30	2.43
	747-748	3098	0.00	1.80	98.20						
	767-768	3099	0.00	1.86	98.14	47.37	50.77	8.26	2.38	0.00	2.03
	787-788	3100	0.00	25.52	74.48	69.39	5.09	4.94	1.53	2.30	9.90
	807-808	3101	0.00	8.37	91.63	47.27	44.36	7.69	2.71	0.06	1.89
	815-816	3102*	0.00	84.28	15.72						
	822-826	3103*	0.00	83.44	16.56	11.67	4.89	2.90	2.11	2.20	8.49
IN-1	2-3	2991	0.00	17.97	82.03	---	---	6.98	2.12	-1.72	4.30
	22-23	2992	0.00	16.16	83.84	45.99	37.85	7.03	2.92	0.02	2.15
	32-33	2993	1.60	30.75	67.65	41.36	26.29	5.67	3.32	-0.01	2.48
	36-38A	2994*	1.60	87.63	10.77	8.17	2.59	2.34	1.90	1.87	11.00
	36-38B	2995*	0.00	70.45	29.55	22.13	7.42	3.59	2.41	1.49	5.31
	38-39	2996*	1.20	93.26	5.54	---	---	2.15	1.62	1.69	9.29
	46-47	2997	0.00	19.24	80.76	43.90	36.86	6.80	2.90	-0.06	2.18
	66-67	2998	0.20	5.75	94.05	27.40	66.65	8.99	2.83	-0.91	3.14
	86-87	2999	0.00	7.13	92.87	40.16	52.71	8.16	3.01	-0.42	2.32
	110-111	3000	0.10	19.23	80.67	---	---	6.54	2.32	-1.26	3.34
	130-131	3001	0.20	17.08	82.72	48.54	34.17	6.82	3.00	0.23	2.18
	140-141	3002	0.00	22.53	77.47	---	---	6.48	2.08	-0.74	1.83
	150-151	3003	0.00	28.43	71.57	48.45	23.13	5.92	2.81	0.77	2.58
	168-169	3004	0.10	31.99	67.91	---	---	5.98	2.39	-0.52	1.74
	179-181	3005	0.00	16.17	83.83	46.93	36.90	6.98	2.87	0.21	1.94
	183-184	3006*	0.00	89.08	10.92	7.46	3.46	2.66	1.81	2.95	13.12
	191-192	3007*	0.00	93.70	6.30	---	---	2.39	1.39	3.14	12.91
	197-198	3008*	0.00	93.37	6.63	---	---	2.18	1.56	2.82	10.91
	200-201	3009*	0.00	24.95	75.05	47.83	27.22	6.21	2.92	0.52	2.24
	211-212	3010	0.00	26.77	73.23	---	---	6.24	2.33	-0.72	1.87
	215-216	3011	0.00	93.73	6.27	---	---	1.83	1.61	2.91	11.42
	223-224	3012	0.00	94.73	5.27	---	---	1.61	1.55	3.08	12.99
	230-231	3013*	0.00	94.47	5.53	---	---	1.64	1.57	2.91	12.01
	240-242	3014*	0.00	20.72	79.28	43.47	35.82	6.82	3.06	0.16	1.99
	244-247	3015*	0.00	18.74	81.26	42.22	39.04	7.07	2.99	0.10	1.92
	248-250	3016*	0.00	94.67	5.33	---	---	1.55	1.58	2.91	12.11
	265-266	3017	0.00	95.12	4.88	---	---	1.61	1.51	2.98	12.87

TABLE 2 con't

CORE	DEPTH cm	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KU
	298-299	3018*	0.00	94.51	5.49	---	---	1.54	1.62	2.88	11.78
	310-311	3019*	0.00	95.70	4.30	---	---	1.33	1.58	3.09	13.38
	319-320	3020*	0.00	52.49	47.51	32.09	15.41	4.76	2.88	0.91	3.23
	330-331	3021*	1.60	91.09	7.31	---	---	1.31	2.07	2.07	7.74
	340-341	3022*	2.20	80.50	17.30	11.81	5.49	2.15	2.69	1.60	6.04
	350-352	3023*	9.00	86.97	4.03	---	---	0.65	1.93	1.34	8.28
	369-371	3024*	4.20	91.08	4.72	---	---	1.09	1.87	1.64	8.78
	374-375	3025*	3.50	91.24	5.26	---	---	1.27	1.90	1.65	8.35
	380-381	3026*	1.00	95.54	3.46	---	---	1.55	1.44	2.15	12.72
	400-402	3027*	1.20	96.24	2.56	---	---	0.88	1.34	2.99	18.31
	420-421	3028	1.00	97.10	1.90	---	---	0.75	1.28	2.95	18.68
	440-441	3029	6.60	91.42	1.98	---	---	0.65	1.54	1.13	11.18
	460-461	3030	10.90	87.06	2.04	---	---	0.34	1.70	0.91	9.00
	480-481	3031	9.60	88.20	2.20	---	---	0.43	1.69	1.07	9.67
	492-495	3032	13.20	84.89	1.91	---	---	0.30	1.74	0.68	8.24
	510-513	3033	20.10	77.94	1.96	---	---	0.07	1.95	0.61	6.44
	550-553	3034	36.80	61.81	1.39	---	---	-0.64	2.07	0.69	4.92
	577-580	3035	23.80	74.76	1.44	---	---	-0.10	1.92	0.36	5.57
	594-597	3036	15.00	82.40	2.60	---	---	0.34	1.93	0.93	7.94
	619-622	3037	19.20	79.60	1.20	---	---	0.22	1.83	0.03	5.87
IN-3	7-8	2920	0.00	6.62	93.38	43.82	49.56	7.93	2.55	-0.32	2.54
	9-10	2921	0.00	36.52	63.48	42.88	20.60	5.64	2.66	0.99	2.86
	32-33	2922	0.00	6.20	93.80						
	42-43	2923	0.00	11.43	88.57	43.40	45.18	7.48	2.73	-0.40	2.58
	43-45	2924*	0.00	91.34	8.66	---	---	2.46	1.57	2.36	8.92
	46-47	2925*	0.00	9.32	90.68	47.28	43.40	7.51	2.67	-0.20	2.44
	51.5-52.5	2926	0.00	9.52	90.48	---	---	7.40	1.67	-2.56	7.99
	64.5-65.5	2927	0.00	8.90	91.10						
	79.5-80.5	2928*	0.30	20.29	79.41	---	---	6.80	2.28	-1.53	3.90
	81-82	2929*	0.00	95.40	4.60	---	---	2.15	1.17	3.46	17.50
	83-84	2930*	0.00	17.67	82.33	42.66	39.67	7.00	2.88	-0.17	2.16
	87-88	2931	0.00	5.90	94.10						
	99-100	2932	0.00	55.77	44.23	23.68	20.55	4.53	3.38	0.68	2.11
	109-110	2933*	0.40	92.84	6.76	---	---	1.96	1.78	1.84	7.70
	110-110.5	2934*	0.30	93.80	5.90	---	---	1.90	1.69	2.51	10.08
	139-140	2935*	0.00	8.60	91.40	41.46	49.94	7.83	2.51	-0.37	2.60
	140-140.5	2936*	0.00	30.22	69.78	35.35	34.43	6.35	3.03	0.08	1.83
	167-168	2937*	0.00	30.81	69.19	40.84	28.35	5.94	2.92	0.05	1.99
	169-170	2938*	0.00	26.17	73.83	40.82	33.00	6.33	3.00	0.05	1.98
	172-173	2939*	0.00	97.37	2.63	---	---	1.81	1.20	3.20	17.16
	175-176	2940*	6.20	89.49	4.31	---	---	1.35	1.87	0.95	7.90
	176-178	2941*	1.20	94.50	4.30	---	---	1.57	1.53	2.44	12.72
	181-182	2942*	0.00	90.64	9.36	---	---	2.34	1.80	2.35	7.84
	186.5-187	2943*	0.00	86.93	13.07	---	---	2.50	2.12	1.88	5.36
	188-189.5	2944*	0.00	35.08	64.92	35.40	29.51	5.84	3.11	0.16	1.83
	192-193	2945*	0.00	66.79	33.21	---	---	4.07	1.91	1.28	3.27
	195-196	2946*	1.40	91.63	6.97	---	---	1.91	1.55	1.53	9.51
	196-197	2947*	0.00	96.20	3.80	---	---	1.62	1.46	2.93	13.54
	199-200	2948*	0.00	35.67	64.33	---	---	5.87	2.79	-0.63	1.57
	212-213	2949	2.90	91.93	5.17	---	---	1.27	1.82	2.11	10.24
	216-217	2950*	0.00	23.17	76.83	33.01	43.83	7.09	3.26	-0.11	1.77
	219-220	2951*	0.00	86.01	13.99	---	---	3.18	1.76	1.95	5.90

TABLE 2 con't

CORE	DEPTH cm	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KU
	220.5-221	2952*	0.00	94.41	5.59	---	---	2.30	1.46	2.84	11.60
	224-225	2953*	0.00	20.55	79.45	---	---	6.81	2.25	-1.43	3.25
	234-235	2954	0.00	28.09	71.91	---	---	6.30	2.37	-0.81	1.94
	237-238	2955	0.00	96.26	3.74	---	---	2.22	1.17	3.53	17.83
	242-243	2956	0.00	92.03	7.97	---	---	2.87	1.42	2.81	10.61
	244-245	2957	0.00	86.51	13.49	---	---	3.03	1.92	1.81	5.35
	249-250	2958	0.40	90.44	9.16	---	---	1.38	2.20	2.34	7.49
	259-260	2959	0.80	90.06	9.14	---	---	1.34	2.22	2.32	7.55
	262-262.5	2960	0.00	84.83	15.17	8.97	6.20	2.97	2.28	2.30	8.33
	262.5-263	2961	0.00	89.42	10.58	5.47	5.11	2.92	2.01	2.90	11.64
	265-266	2962	4.70	86.46	8.84	---	---	1.31	2.33	1.73	6.52
	268-269	2963	0.60	84.93	14.47	6.55	7.92	2.05	2.87	2.05	6.47
	269-270	2964	0.00	56.61	43.39	13.03	30.36	5.00	3.96	0.57	1.68
	278-279	2965	0.00	10.75	89.25	---	---	7.34	1.85	-2.59	8.05
	300-301	2966	0.00	8.82	91.18	23.68	67.49	8.80	2.86	-0.91	3.03
	320-321	2967	0.00	50.07	49.93	---	---	5.40	2.41	0.10	1.10
	324-325	2968	0.00	4.80	95.20	25.14	70.06	9.10	2.52	-1.00	3.72
	349-350	2969	0.00	13.98	86.02	---	---	7.14	2.12	-2.15	5.87
	352-353	2970	0.00	41.78	58.22	---	---	5.40	3.05	-0.38	1.25
	360-361	2971*	0.00	6.25	93.75	29.91	63.84	8.76	2.68	-0.78	3.13
	375.5-376.5	2972*	0.00	85.21	14.79	7.50	7.29	3.03	2.39	2.30	7.89
	376.5-377.5	2973*	0.90	95.19	3.91	---	---	1.72	1.45	1.96	11.41
	377.5-378.5	2974*	0.80	96.29	2.91	---	---	1.20	1.33	2.71	16.27
	378.5-379	2975*	1.10	92.15	6.75	---	---	1.64	1.80	2.27	9.44
	380-381	2976*	5.60	6.55	87.85	27.49	60.36	8.07	3.82	-1.41	4.68
	387-388	2977	0.00	1.36	98.64	20.24	78.40	9.50	1.94	-0.92	4.32
	400-401	2978	0.00	1.46	98.54	21.58	76.96	9.47	1.97	-0.89	4.18
	412-413	2979	0.00	0.60	99.40	23.19	76.21	9.53	1.96	-0.59	2.81
	420-421	2980	0.00	0.84	99.16	23.41	75.75	9.50	2.00	-0.66	3.02
	440-441	2981	0.00	1.80	98.20	25.09	73.11	9.34	2.13	-0.82	3.78
	460-461	2982	0.00	0.24	99.76	43.22	56.54	8.67	2.25	0.00	1.72
	462.5-463.5	2983	0.30	48.87	50.83	20.43	30.40	5.22	3.98	0.34	1.66
	466-467	2984	0.00	9.98	90.02	32.48	57.54	8.28	2.91	-0.62	2.56
	468-470	2985	0.00	47.91	52.09	17.94	34.14	5.35	4.31	0.25	1.47
	484-487A	2986	0.40	72.51	27.09	9.70	17.39	3.16	3.85	1.22	3.00
	484-487B	2987	0.00	5.20	94.80						
	502-503	2988	1.40	76.12	22.48	---	---	2.68	2.96	1.02	2.60
	509-510	2989	0.00	86.16	13.84	---	---	2.04	2.46	1.77	4.71
	530-531	2990	1.00	5.69	93.31	78.74	14.57	5.72	2.30	0.86	5.03
IT0.1	0-3	2702	0.00	30.23	69.77	45.00	24.78	6.07	2.72	0.74	2.38
	5-9	2703	0.00	29.01	70.99	---	---	6.22	2.13	-0.41	1.26
	11-14	2704	0.00	34.41	65.59	45.98	19.61	5.63	2.57	1.11	3.08
	20.5-24	2705	0.00	24.14	75.86	---	---	6.53	2.08	-0.77	1.69
	25-26	2706*	0.00	23.00	77.00	46.08	30.93	6.56	2.81	0.47	2.04
	27	2707*	0.00	93.29	6.71	---	---	2.80	1.03	2.60	14.05
	35-38	2708	0.00	23.34	76.66	44.53	32.13	6.65	2.78	0.45	1.97
	45-46	2709*	0.00	39.96	60.04	---	---	5.87	2.41	-0.31	1.25
	46-48	2710*	0.00	80.72	19.28	12.98	6.30	3.45	2.14	2.31	8.30
	48-48.5	2711*	0.00	30.88	69.12	45.37	23.75	5.90	2.77	0.70	2.46
	50-50.5	2712	0.00	32.26	67.74	43.33	24.41	5.98	2.74	0.77	2.41
	50.5-51	2713	0.00	88.42	11.58	9.68	1.90	2.96	1.41	2.94	15.84
	51-52	2714*	0.00	93.64	6.36	4.58	1.78	2.39	1.42	3.55	19.65

TABLE 2 con't

CORE	DEPTH cm	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KU
	52-53	2715*	0.00	29.66	70.34	44.37	25.97	6.08	2.82	0.62	2.29
	53.5-55	2716*	0.00	22.22	77.78	54.79	22.99	6.06	2.50	0.85	2.64
	55-55.5	2717*	0.00	68.45	31.55	25.09	6.46	4.06	1.96	2.23	8.12
	55.5-56.5	2718*	0.00	38.37	61.63	50.82	10.81	5.03	2.01	1.57	5.00
	56.5-57.5	2719*	0.00	72.62	27.38	22.71	4.68	3.98	1.63	2.83	11.89
	57.5-58	2720*	0.00	26.23	73.77	46.44	27.34	6.28	2.69	0.60	2.20
	60-64	2721	0.00	46.37	53.64	---	---	5.65	2.34	-0.03	1.06
	70-74	2722	0.00	36.86	63.14	---	---	6.06	2.33	-0.42	1.29
	74-79	2723	0.00	38.49	61.51	---	---	6.01	2.28	-0.30	1.15
	80-81	2724*	0.00	34.98	65.02	39.12	25.90	5.99	2.86	0.63	2.19
	81-82.5	2725*	0.00	76.29	23.71	17.82	5.89	3.97	1.81	2.63	9.93
	82.5-84	2726*	0.00	34.52	65.48	48.15	17.33	5.50	2.42	1.05	3.18
	93-94	2727*	0.00	33.71	66.29	---	---	6.05	2.22	-0.31	1.20
	94-94.5	2728*	0.00	79.14	20.86	18.92	1.94	3.60	1.19	3.53	20.66
	94.5-95.5	2729*	0.00	85.66	14.34	---	---	3.39	1.23	2.57	10.31
	95.5-96	2730*	0.00	87.44	12.56	---	---	3.15	1.59	2.03	6.96
	96-98.5	2731*	0.00	28.79	71.21	45.33	25.87	6.13	2.75	0.72	2.29
	98.5-100	2732*	0.00	85.87	14.13	---	---	3.03	1.82	1.81	5.63
	100-101	2733*	0.00	48.53	51.47	42.23	9.24	4.68	2.06	2.05	6.78
	101-102	2734*	0.00	58.42	41.58	35.99	5.60	4.26	1.68	2.57	10.06
	102-103	2735*	0.00	42.62	57.38	40.51	16.88	5.30	2.50	1.14	3.28
	110-112	2736	0.00	24.80	75.20	45.25	29.95	6.49	2.74	0.53	2.06
	116.5-117	2737	0.00	9.98	90.02	44.91	45.11	7.68	2.71	0.06	1.81
	117-118	2738	0.00	30.37	69.63	47.07	22.56	5.87	2.65	0.78	2.54
	120-121	2739*	0.00	66.23	33.77	31.23	2.54	3.95	1.23	3.17	16.67
	121-122	2740*	0.00	42.50	57.50	50.73	6.77	4.65	1.71	2.27	8.56
	122-126	2741*	0.00	60.09	39.91	---	---	4.94	2.17	0.66	1.52
	147-149	2742*	0.00	72.90	27.10	24.35	2.75	3.87	1.34	3.28	17.16
	164-166	2743*	0.00	92.72	7.28	---	---	3.05	1.32	2.88	11.27
	174-175	2744*	0.00	84.85	15.15	---	---	3.78	1.63	2.05	5.60
	177-178.5	2745*	0.00	69.13	30.87	29.09	1.78	3.70	1.20	2.97	16.68
	178.5-179	2746*	0.00	67.45	32.55	27.52	5.03	3.86	1.81	2.29	9.03
	183-184	2747*	0.00	18.81	81.19	47.28	33.92	6.78	2.81	0.44	1.92
	186-187	2748*	0.00	82.69	17.31	---	---	3.91	1.68	1.89	4.91
	198-199	2749*	0.00	81.58	18.42	---	---	4.01	1.59	2.01	5.31
	200-202	2750*	0.00	85.65	14.35	---	---	3.43	1.65	1.95	6.07
	202-204	2751*	0.00	93.04	6.96	---	---	2.80	1.37	2.96	11.56
	204-205	2752*	0.00	92.80	7.20	---	---	2.61	1.42	2.62	10.49
	205-206	2753*	0.00	26.55	73.45	42.18	31.27	6.54	2.88	0.45	1.98
	210-212	2754*	0.00	82.67	17.33	---	---	3.91	1.61	2.02	5.39
	218-219	2755*	0.00	82.36	17.64	---	---	3.85	1.81	1.73	4.32
	235-237	2756*	0.00	33.56	66.44	47.80	18.64	5.61	2.48	1.16	3.28
	237-238	2757*	0.00	80.36	19.64	---	---	3.88	1.66	1.90	5.06
	238-239	2758*	0.00	86.82	13.18	---	---	3.46	1.36	2.60	9.13
	239-240	2759*	0.00	83.76	16.24	---	---	3.55	1.48	2.28	7.25
	240-242	2760*	0.00	62.91	37.09	---	---	4.84	2.13	0.76	1.67
	242-243	2761*	0.00	30.28	69.72	47.73	21.99	5.89	2.61	0.92	2.73
IT0.3	0-1	2762	0.00	51.90	48.10	---	---	5.21	2.30	0.33	1.22
	20-22	2763*	0.00	86.86	13.14	---	---	3.46	1.40	2.49	8.55
	30-32	2764*	0.00	82.06	17.94	14.99	2.95	3.31	1.56	3.19	15.78
	45-46	2765	2.20	10.16	87.64	34.44	53.21	7.83	3.29	-0.81	3.25
	55-56	2766	0.20	17.07	82.73	41.49	41.24	7.17	3.07	-0.06	2.11

TABLE 2 con't

CORE	DEPTH cm	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KU
	65-67	2767*	0.00	60.41	39.59	31.96	7.63	4.24	2.03	2.13	7.46
	80-82	2768*	0.00	60.61	39.39	---	---	4.88	2.42	0.45	1.33
	100-102	2769*	0.00	46.42	53.58	36.29	17.29	5.16	2.64	1.22	3.36
	120-122	2770*	0.00	85.76	14.24	---	---	3.46	1.49	2.34	7.52
	175-177	2771	0.90	39.99	59.11	31.19	27.92	5.82	3.23	0.38	2.27
	203-205	2772	0.10	32.60	67.30	32.31	34.98	6.46	3.24	0.22	1.80
	253-255	2773	4.80	28.36	66.84	---	---	5.83	2.98	-1.27	4.14
	275-277	2774	1.10	48.03	50.87	36.14	14.73	4.83	2.67	0.97	4.16
	294-296	2775	0.00	66.14	33.86	---	---	4.38	2.20	0.90	2.10
	304-306	2776	0.00	75.14	24.86	14.84	10.02	4.00	2.41	1.92	5.81
	314-316	2777	0.00	87.90	12.10	---	---	3.35	1.68	2.15	6.36
	324-326	2778	1.80	73.27	24.93	13.59	11.34	3.93	2.74	1.31	5.04
	334-336	2779	0.00	74.62	25.38	---	---	4.16	2.21	1.07	2.36
	344-346	2780	0.00	61.92	38.08	20.89	17.19	4.77	2.83	1.21	3.20
	354-356	2781	1.20	75.80	23.00	---	---	3.95	2.26	0.78	3.37
	364-366	2782	0.10	36.05	63.85	44.73	19.12	5.49	2.63	1.08	3.21
	374-376	2783	0.00	70.94	29.06	---	---	4.04	1.99	1.26	3.10
	384-386	2784	0.00	67.28	32.72	19.29	13.43	4.44	2.61	1.53	4.27
	394-396	2785	0.00	78.94	21.06	---	---	3.90	2.03	1.37	3.25
	404-406	2786	0.00	81.47	18.53	12.25	6.28	3.67	1.99	2.59	9.46
	414-416	2787	0.00	68.57	31.43	---	---	4.39	2.16	0.98	2.16
	424-426	2788	1.20	44.76	54.04	34.47	19.57	5.24	2.90	0.69	3.23
IT0.4	4-6	2793	0.00	5.37	94.63	---	---	7.66	1.33	-3.86	17.00
	7-9	2794*	0.10	5.92	93.98	38.52	55.46	8.29	2.66	-0.56	2.90
	12-14	2795*	0.00	83.73	16.27	12.77	3.50	3.67	1.48	3.56	17.19
	15-16	2796*	0.00	11.35	88.65	41.52	47.13	7.74	2.72	-0.18	2.12
	24-25	2797*	0.50	13.04	86.46	40.43	46.03	7.54	3.02	-0.40	2.76
	34-35	2798	0.20	26.64	73.16	---	---	6.32	2.69	-1.11	2.52
	39-41	2799	0.00	69.31	30.69	26.89	3.80	3.87	1.60	2.77	12.92
	45-47	2800	2.10	9.79	88.11	---	---	7.15	2.34	-2.82	10.28
	65-67	2801	0.00	23.88	76.12	37.63	38.49	6.89	3.18	0.07	1.82
	76-77	2802	0.00	83.50	16.50	---	---	3.40	2.07	1.47	3.91
	80-81	2803	0.00	88.32	11.68	---	---	3.10	1.38	2.35	9.09
	90-91	2804*	0.00	94.69	5.31	---	---	2.38	1.31	2.79	12.50
	98-99	2805*	0.00	93.51	6.50	---	---	2.17	1.46	2.07	9.05
	102-103	2806*	0.00	92.45	7.55	---	---	2.26	1.59	2.10	8.35
	110-111	2807*	0.00	91.87	8.13	---	---	2.25	1.62	2.14	8.31
	120-121	2808*	0.00	87.03	12.97	11.03	1.94	2.60	1.63	2.55	13.28
	126-127	2809*	0.00	86.12	13.88	---	---	3.13	1.41	2.25	8.39
	130-131	2810*	0.00	88.94	11.06	---	---	2.80	1.54	2.10	7.87
	139-141	2811*	0.10	16.65	83.25	---	---	7.08	1.85	-1.65	4.30
	144-145	2812*	0.00	9.51	90.49	45.41	45.08	7.64	2.68	0.01	1.94
	148-149	2813*	0.00	61.71	38.29	36.36	1.92	3.97	1.12	3.42	20.09
	152-153	2814*	0.00	78.46	21.54	---	---	3.43	1.46	1.92	6.81
	156-157	2815*	0.00	87.59	12.41	---	---	3.03	1.38	2.15	8.64
	160-161	2816*	0.00	86.09	13.91	---	---	3.02	1.61	1.99	6.88
	174-175	2817*	0.40	6.22	93.38	49.15	44.23	7.66	2.68	-0.23	2.99
	175.5-176	2818*	0.00	45.24	54.76	48.20	6.56	4.53	1.88	2.11	8.17
	178-179	2819*	1.70	3.91	94.39	37.10	57.29	8.33	2.81	-1.04	4.76
	180-181	2820*	0.00	42.93	57.07	---	---	5.57	2.39	-0.11	1.33
	185-186	2821*	0.00	61.21	38.79	31.45	7.34	4.36	1.85	2.29	8.15
	190-191	2822*	0.40	4.03	95.57	46.46	49.11	7.95	2.52	-0.38	3.41

TABLE 2 con't

CORE	DEPTH cm	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KU
	194-195	2823*	0.00	49.31	50.69	---	---	5.30	2.51	0.05	1.20
	200-201	2824*	0.00	65.59	34.41	28.38	6.02	4.15	1.87	2.49	9.53
	205-206	2825*	0.00	6.60	93.40						
	210-211	2826*	0.00	81.18	18.82	13.44	5.38	3.51	1.91	2.51	9.48
	215-217	2827*	0.00	80.50	19.50	---	---	3.52	1.82	1.68	4.71
	220-221	2828*	0.00	88.92	11.08	---	---	3.04	1.69	2.10	6.74
	225-226	2829*	0.00	91.30	8.70	---	---	2.84	1.59	2.34	8.19
	230-231	2830*	0.00	93.67	6.33	---	---	2.58	1.39	2.58	10.74
	235-236	2831*	0.00	93.42	6.58	---	---	2.61	1.47	2.50	9.92
	240-241	2832*	0.00	90.03	9.97	---	---	2.75	1.67	2.08	7.31
	245-246	2833*	0.00	90.85	9.15	7.29	1.86	2.69	1.47	2.78	14.99
	250-251	2834	0.00	75.95	24.05	18.73	5.32	3.34	2.11	1.70	6.41
	255-256	2835	0.00	88.85	11.15	---	---	3.24	1.34	2.67	9.89
	260-261	2836*	0.00	92.09	7.91	---	---	2.80	1.41	2.50	9.88
	265-266	2837*	0.00	93.88	6.12	---	---	2.70	1.40	2.65	10.75
	270-271	2838*	0.00	90.09	9.91	---	---	2.94	1.60	2.13	7.47
	276-277	2839*	0.00	35.29	64.71	54.81	9.90	4.98	2.05	1.26	4.64
	280-282	2840*	0.00	54.53	45.47	41.04	4.44	4.35	1.50	2.33	9.68
	285-286	2841*	0.00	91.12	8.88	6.41	2.47	2.82	1.50	3.35	17.10
	290-291	2842*	0.00	94.47	5.53	---	---	2.18	1.48	2.73	11.14
	295-296	2843*	0.00	95.37	4.63	---	---	2.13	1.48	2.67	11.21
	300-301	2844*	0.00	94.62	5.38	---	---	2.28	1.52	2.42	9.90
	305-306	2845*	0.00	94.28	5.72	---	---	2.34	1.55	2.29	9.28
	310-311	2846*	0.00	93.66	6.34	---	---	2.33	1.53	2.37	9.58
	315-317	2847*	0.00	94.77	5.23	---	---	2.30	1.51	2.41	10.00
	320-321	2848	0.00	95.78	4.22	---	---	2.12	1.43	2.52	11.29
	324-325	2849	0.20	91.94	7.86	---	---	2.30	1.69	2.10	8.12
IT1.2	9-10	2850	0.00	91.62	8.38	6.24	2.14	2.81	1.41	3.63	19.63
	40-41	2851	0.20	59.82	39.98	24.94	15.05	4.50	2.80	1.06	3.29
	49-50	2852	0.00	66.15	33.85	---	---	4.26	2.55	0.60	1.72
	60-61	2853	0.20	54.91	44.89	---	---	4.97	2.49	0.24	1.47
	75-76	2854*	0.00	56.68	43.32	29.98	13.34	4.69	2.53	1.35	3.91
	81-82	2855*	0.00	94.14	5.86	---	---	2.52	1.26	3.09	13.78
	82-83	2856*	0.30	50.42	49.28	33.16	16.13	4.94	2.71	1.06	3.44
	105-106	2857	0.00	47.94	52.06	---	---	5.39	2.58	-0.08	1.21
	112-113	2858	0.70	89.83	9.47	---	---	2.43	1.83	1.74	7.01
	119-120	2859	0.00	50.32	49.68	30.17	19.51	5.06	2.85	0.88	2.72
	121-122	2860*	0.59	87.10	12.31	7.36	4.95	1.92	2.43	2.26	8.07
	127-128	2861*	4.52	92.00	3.48	---	---	0.56	1.63	2.97	13.58
	133-134	2862*	9.68	85.66	4.66	---	---	0.45	2.02	1.98	8.43
	136-137	2863*	31.97	62.91	5.12	---	---	0.14	2.67	0.82	3.82
	140-141	2864*	0.40	63.00	36.60	---	---	4.56	2.56	0.38	1.78
	160-161	2865	0.70	51.90	47.40	33.36	14.04	4.75	2.57	1.04	4.04
	170-171	2866	0.04	60.79	39.17	22.65	16.52	4.54	2.84	1.14	3.13
	173-174	2867	0.00	73.93	26.07	15.87	10.20	3.88	2.46	1.84	5.48
	180-181	2868*	0.00	89.30	10.70	---	---	3.06	1.54	2.47	8.33
	186-187	2869*	0.00	95.83	4.17	---	---	2.64	1.15	3.57	17.13
	193-194	2870*	0.00	91.95	8.05	---	---	2.84	1.52	2.60	9.31
	199-200	2871*	0.00	86.90	13.10	---	---	3.21	1.49	2.40	8.07
	220-221	2872	0.00	60.26	39.74	23.98	15.76	4.65	2.65	1.26	3.41
	230-231	2873	0.00	83.55	16.45	12.00	4.45	3.43	1.76	3.02	12.65
	250-251	2874	0.00	88.99	11.01	---	---	3.14	1.47	2.60	8.87

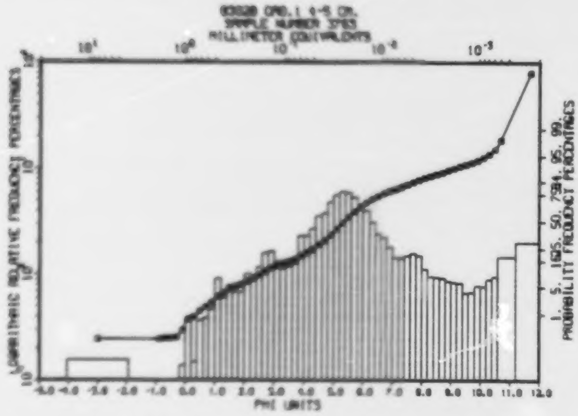
TABLE 2 con't

CORE	DEPTH cm	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KU
	270-271	2875	0.00	64.79	35.21	22.11	13.10	4.32	2.67	1.52	4.25
	290-291	2876	0.00	82.37	17.63	---	---	3.37	1.88	1.72	4.76
	310-311	2877	0.00	90.10	9.90	---	---	3.06	1.29	2.76	11.14
	330-331	2878	0.10	66.74	33.16	21.96	11.21	4.20	2.48	1.65	5.00
	350-351	2879	0.10	86.13	13.77	---	---	3.12	1.66	2.04	6.79
	371-372	2880*	0.00	76.14	23.86	17.04	6.82	3.68	2.09	2.20	7.72
	379-380	2881*	0.00	64.70	35.30	24.47	10.83	4.20	2.39	1.60	4.81
	388-389	2882*	0.00	64.30	35.70	---	---	4.29	2.23	0.87	2.13
	395-396	2883*	0.00	67.64	32.36	---	---	4.14	2.10	1.10	2.60
	400-401	2884	0.00	68.34	31.66	---	---	4.29	2.30	0.87	1.99
	420-421	2885	0.00	58.01	41.99	---	---	4.77	2.49	0.43	1.35
	440-441	2886	0.00	52.88	47.12	26.80	20.32	5.03	2.92	0.87	2.49
	460-461	2887	0.00	61.35	38.65	21.06	17.59	4.64	2.91	1.11	2.94
	480-481	2888	0.00	76.43	23.57	15.36	8.21	3.74	2.27	2.08	6.81
	499-500	2889	0.00	83.93	16.07	10.37	5.70	3.36	1.99	2.70	10.23
	508-509	2890*	0.00	46.78	53.22	29.51	23.71	5.40	3.01	0.70	2.22
	520-522	2891*	0.00	50.89	49.11	---	---	5.08	2.48	0.23	1.23
	527-529	2892*	0.00	92.35	7.65	---	---	2.74	1.24	3.02	13.11
	532-535	2893*	0.00	75.13	24.87	---	---	3.80	2.00	1.32	3.43
	535-539	2894*	0.00	92.56	7.45	---	---	2.96	1.43	2.76	10.18
	584-586	2895*	0.00	96.33	3.67	---	---	2.38	0.99	3.24	18.82
	591-593	2896*	0.00	86.07	13.93	---	---	3.21	1.31	2.34	9.27
	600-603	2897	0.00	93.96	6.04	---	---	2.65	1.03	3.16	16.48
MA-2	5-6	3104	0.00	7.42	92.58	33.19	59.39	8.35	2.82	-0.33	1.72
	30-31	3105	0.00	1.59	98.41						
	60-61	3106	0.00	1.89	98.11						
	90-91	3107	0.00	1.01	98.99	17.68	81.31	9.66	1.93	-0.94	4.21
	120-121	3108	0.00	1.71	98.29						
	150-151	3109	0.00	1.04	98.96						
	180-181	3110	0.00	2.27	97.73	22.15	75.58	9.37	2.17	-0.91	3.70
	210-211	3111	0.00	7.98	92.02	20.62	71.40	8.93	2.75	-1.13	3.72
	240-241	3112	0.00	0.70	99.30						
	270-271	3113	0.00	0.73	99.27						
	300-301	3114	0.00	1.12	98.88	22.09	76.79	9.48	2.04	-0.83	3.60
	328-329	3115	0.00	1.43	98.57						
	360-361	3116	0.00	1.12	98.88						
	390-391	3117	0.13	1.71	98.16	36.61	61.55	8.76	2.33	-0.48	3.05
	420-421	3118	0.00	3.21	96.79						
	450-451	3119	0.16	1.24	98.60						
	492.5-493.5	3120	0.00	6.83	93.17	46.78	46.39	7.80	2.72	0.07	1.74
	494-494.5	3121	0.00	50.11	49.89	28.80	21.09	4.75	3.47	0.70	2.21
	528-529	3122	0.00	3.62	96.38	34.71	61.67	8.75	2.58	-0.59	2.67
	529-530	3123	8.14	49.20	42.66	22.13	20.53	3.62	4.33	0.45	2.01
	615-616	3124	0.00	7.99	92.01	38.81	53.21	8.13	2.98	-0.41	2.19
	616-617	3125	0.00	13.40	86.60	70.54	16.06	5.95	2.19	1.30	3.90
	636.5-637.5	3126	0.00	5.15	94.85	45.84	49.01	7.94	2.73	0.03	1.61
	637.5-638	3127	0.00	54.29	45.71	31.07	14.64	4.84	2.61	1.46	4.04
	683-684	3128	0.00	7.29	92.71	32.52	60.20	8.52	2.90	-0.66	2.55
	685-686	3129	0.00	24.73	75.27	63.15	12.11	5.36	2.08	1.59	5.05
	750-751	3130	0.00	10.59	89.41	36.47	52.94	8.14	2.86	-0.19	1.68
	751-752	3131	0.00	13.24	86.76	62.67	24.08	6.34	2.43	0.85	2.62
	777-778	3132	0.00	8.87	91.13	35.96	55.17	8.11	2.92	-0.52	2.39

TABLE 2 con't

CORE	DEPTH cm	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KU
	779-780	3133	0.07	63.87	36.06	24.10	11.96	3.86	2.88	1.32	3.94
	827-828	3134*	0.00	7.71	92.29	49.00	43.29	7.62	2.64	0.09	1.93
	828-829	3135*	0.00	35.44	64.56	53.34	11.22	5.00	2.14	1.61	5.18
	834-835	3136*	0.00	66.27	33.73	27.85	5.87	3.99	1.89	2.42	9.14
	892-893	3137	0.00	12.24	87.76	42.92	44.84	7.56	2.81	0.00	1.84
	895-896	3138	0.00	50.07	49.93	39.46	10.47	4.63	2.29	1.54	5.08
	923-924	3139	0.00	10.98	89.02	36.80	52.22	8.01	2.85	-0.19	1.78
	924.5-925	3140	0.00	39.48	60.52	38.62	21.90	5.61	2.93	0.93	2.65
	958-959	3141*	0.00	15.71	84.29	47.27	37.02	7.06	2.77	0.29	1.88
	960-961	3142*	0.00	47.07	52.93	40.55	12.39	4.87	2.33	1.42	4.24
	1008-1009	3143	0.00	6.51	93.49	47.49	46.00	7.80	2.74	-0.20	2.31
	1012-1013	3144	0.00	64.26	35.74	28.26	7.48	4.20	2.06	2.38	8.33
MA-4	3-4.5	3176	0.00	4.64	95.36	20.14	75.23	9.07	2.38	-1.21	4.41
	50-51.5	3177	0.00	1.57	98.43						
	100-101.5	3178	0.00	2.17	97.83	29.35	68.48	8.95	2.30	-0.71	3.11
	151-151.5	3179	0.00	1.78	98.22						
	190-191.5	3180	0.00	5.19	94.81	27.82	66.99	8.81	2.58	-0.89	3.35
	210-211.5	3181	0.00	2.00	98.00						
	250-251.5	3182	0.00	1.02	98.98						
	280-281.5	3183	0.00	0.30	99.70	37.44	62.26	8.89	2.09	-0.13	1.99
	313-314	3184	0.00	47.55	52.45	41.05	11.40	4.90	2.35	1.79	5.43
	320-321.5	3185	0.00	2.03	97.97	40.68	57.29	8.58	2.34	-0.24	2.26
	351-352	3186	0.00	48.67	51.33	39.88	11.45	4.89	2.25	1.87	5.64
	370-371.5	3187	0.69	2.87	96.44						
	390-391.5	3188	0.00	3.66	96.34	40.93	55.41	8.38	2.56	-0.31	2.29
	407-409	3189	0.00	29.21	70.79	48.76	22.03	5.87	2.77	0.96	2.72
	410-411.5	3190	0.00	2.20	97.80	37.00	60.80	8.82	2.34	-0.41	2.67
	450-451.5	3191	0.32	11.24	88.44	40.58	47.86	7.84	2.97	-0.39	2.55
	470-471.5	3192	0.21	17.02	82.77	49.46	33.32	6.72	3.03	0.25	2.17
	490-491.5	3193	0.00	39.81	60.19	35.44	24.75	5.66	3.19	0.61	2.17
	538-539	3194	0.00	76.54	23.46	16.05	7.41	3.75	2.25	2.22	7.49
	560-561.5	3195	0.00	3.01	96.99	46.02	50.97	8.22	2.58	-0.16	2.20
	600-601	3196	0.00	42.67	57.33	41.54	15.78	5.22	2.59	1.39	3.83
	640-641.5	3197	0.00	7.73	92.27	46.18	46.09	7.73	2.79	-0.23	2.32
	652-653	3198*	0.00	38.37	61.63	46.76	14.87	5.21	2.45	1.51	4.21
	670-671	3199*	0.00	22.82	77.18	66.32	10.86	5.28	2.02	1.84	5.89
	673-674	3200*	0.00	43.42	56.58	52.68	3.90	4.39	1.49	2.64	12.29
	770-771.5	3201	0.00	0.73	99.27						
	820-821.5	3202	0.00	0.30	99.70	37.22	62.48	8.96	2.01	-0.07	2.05
	860-861.5	3203	0.00	0.17	99.83						
	880-881.5	3204	0.00	2.40	97.60	50.92	46.68	8.02	2.46	0.01	2.21
	940-941.5	3205	0.00	2.59	97.41						
	960-961.5	3206	0.00	8.64	91.36	59.41	31.95	6.95	2.65	0.22	2.47
	967-968	3207	0.00	27.33	72.67	52.26	20.41	5.83	2.60	1.08	3.02
	970-972	3208	0.00	25.25	74.75	56.05	18.70	5.77	2.49	1.28	3.47
	976-979	3209*	0.00	50.96	49.04	30.03	19.01	5.27	2.75	1.28	3.26

FIGURE 1 - Grain size frequency plots for the core intervals listed in Table 2. Histograms are plotted against the logarithmic frequency axis on the left, and cumulative curves are plotted against the probability axis on the right.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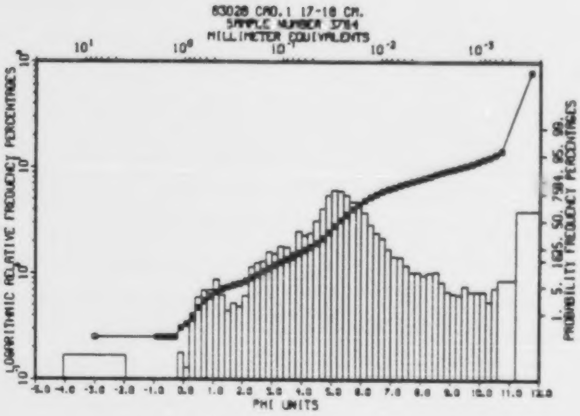
SAMPLE NUMBER 3763
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS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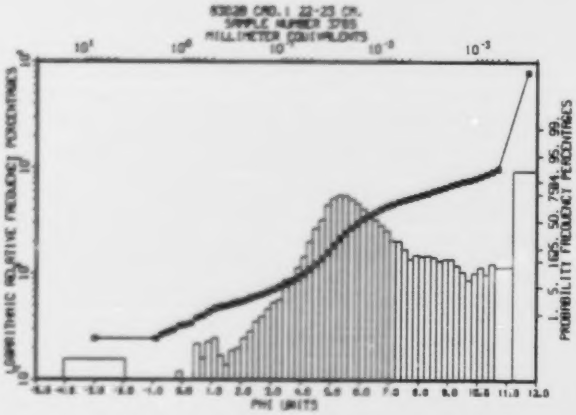
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


83028 CRD.1 22-23 CM.
SAMPLE NUMBER 3765
MILLIMETER EQUIVALENTS
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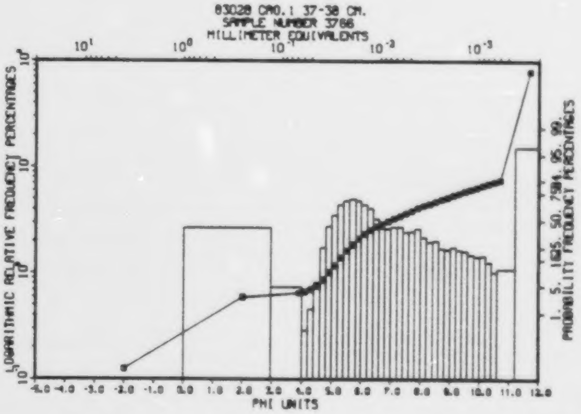
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


83028 CRD.1 37-38 CM.
SAMPLE NUMBER 3766
MILLIMETER EQUIVALENTS
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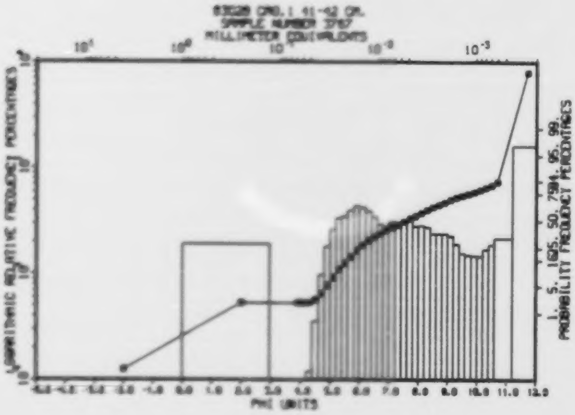
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS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SAMPLE NUMBER 3767
MILLIMETER EQUIVALENTS
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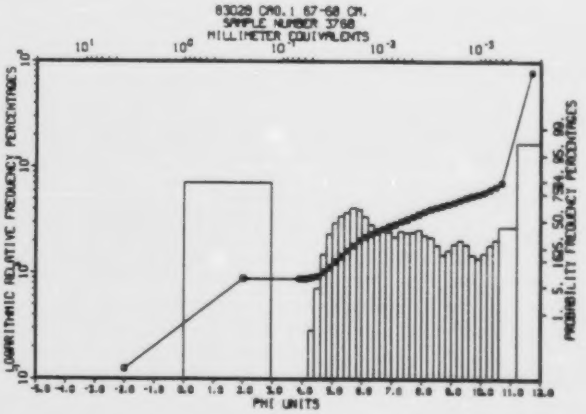
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS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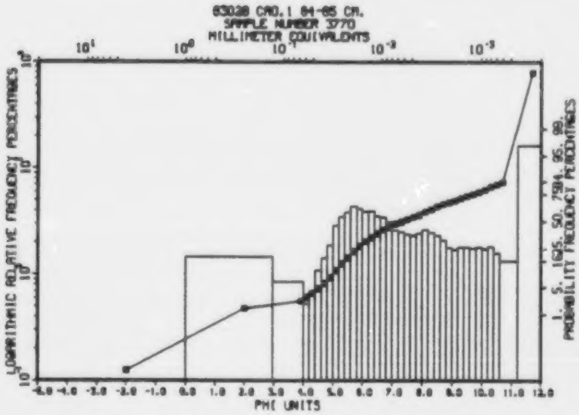
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

83028 CAO.1 84-85 CM.
SAMPLE NUMBER 3770



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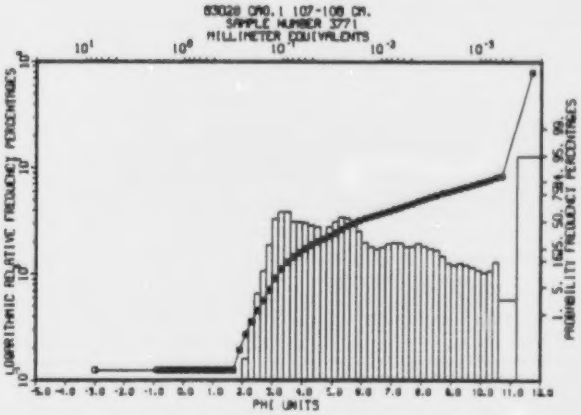
SAMPLE NUMBER 3771



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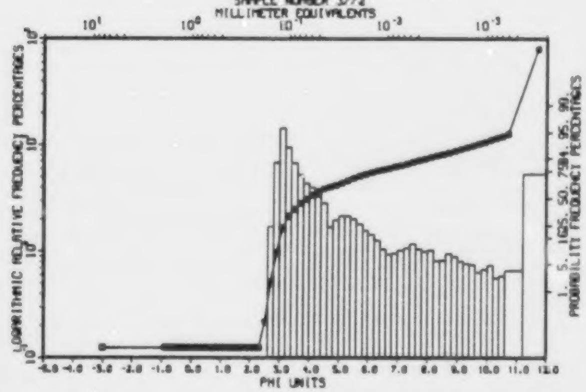
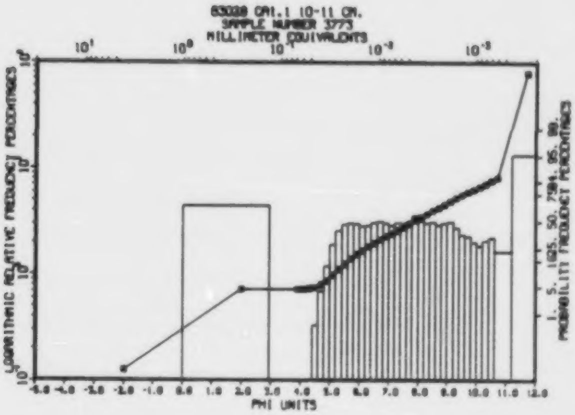
SAMPLE NUMBER 3772

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SAMPLE NUMBER 3773
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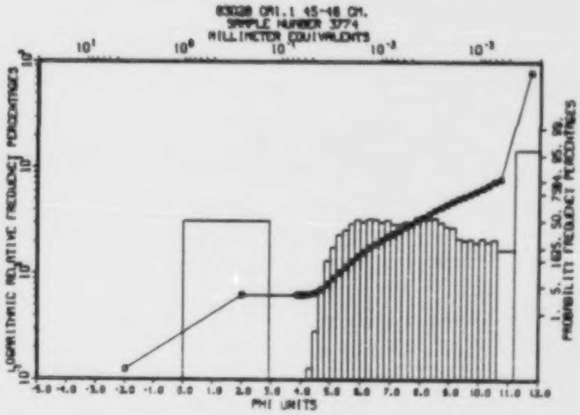
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS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SAMPLE NUMBER 3774
MILLIMETER EQUIVALENTS
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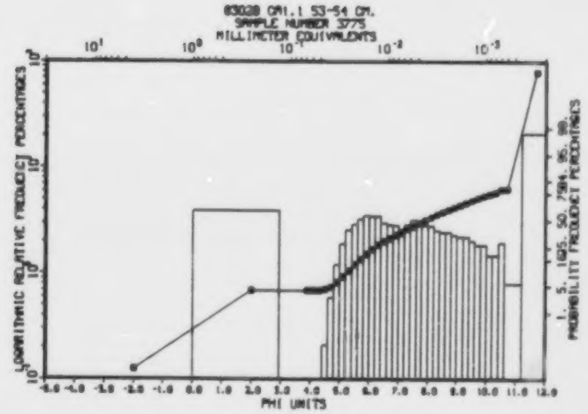
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS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SAMPLE NUMBER 3775
MILLIMETER EQUIVALENTS
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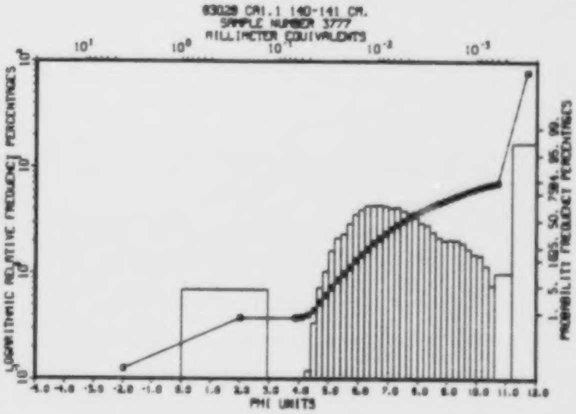
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS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SAMPLE NUMBER 3777
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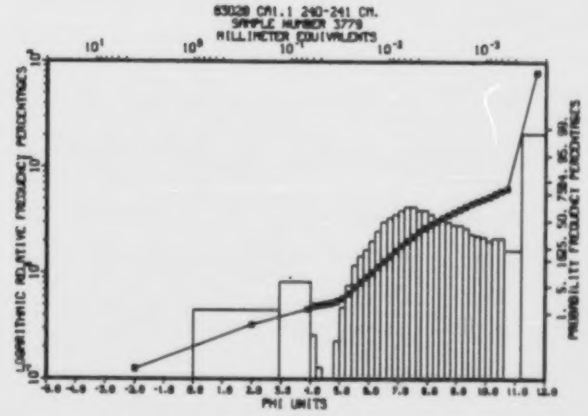
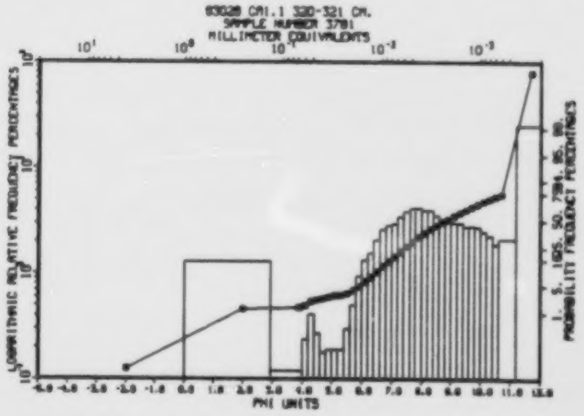
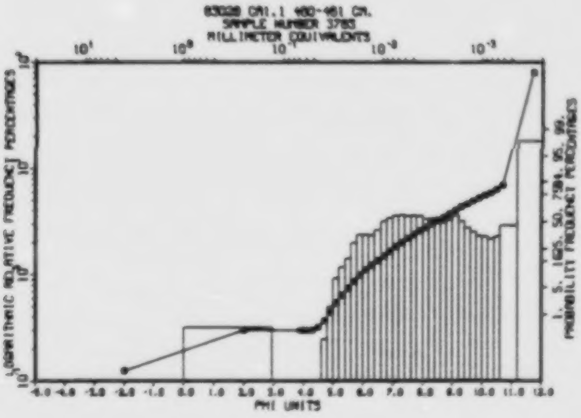
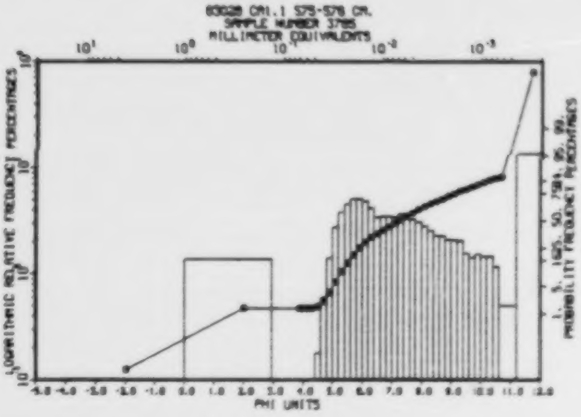
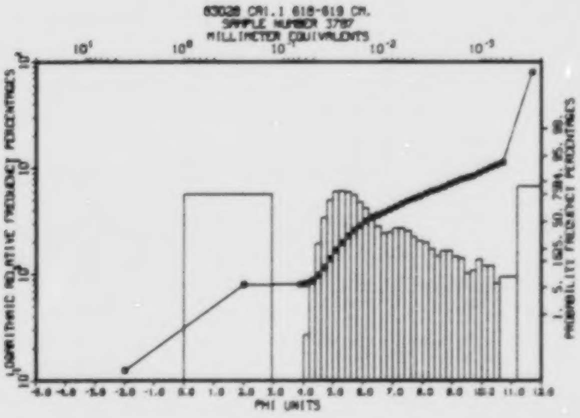
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS

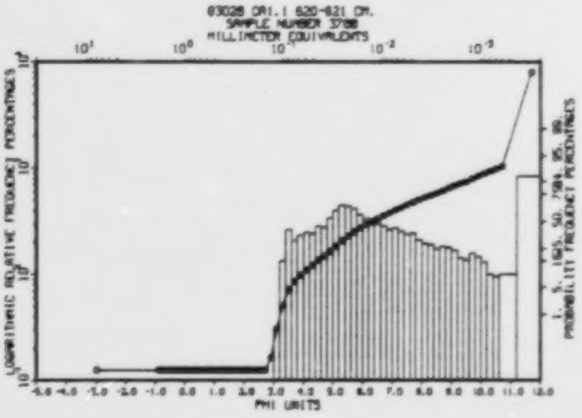

83028 CA1.1 240-241 CM.
SAMPLE NUMBER 3779
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS

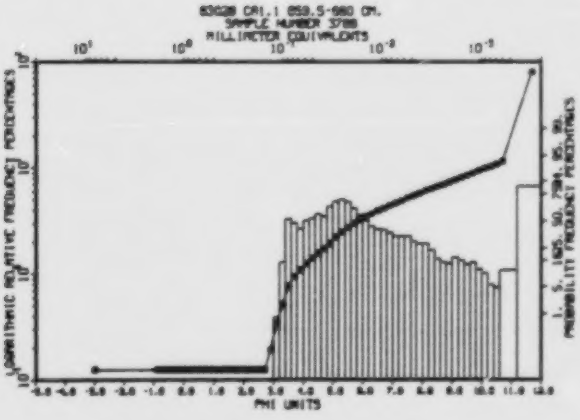

83028 CA1.1 320-321 CM.
SAMPLE NUMBER 3781
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS

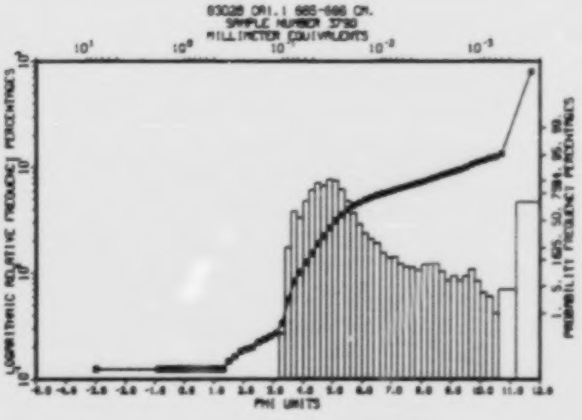

83028 CA1.1 480-481 CM.
SAMPLE NUMBER 3783
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS


83028 CA1.1 575-576 CM.
SAMPLE NUMBER 3785
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

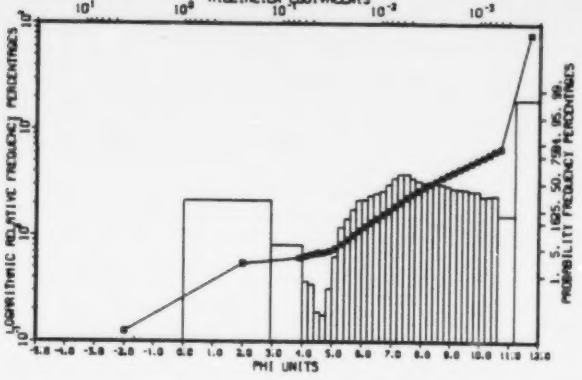

83028 CA1.1 618-619 CM.
SAMPLE NUMBER 3787
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS


83028 CA1.1 620-621 CM.
SAMPLE NUMBER 3788
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

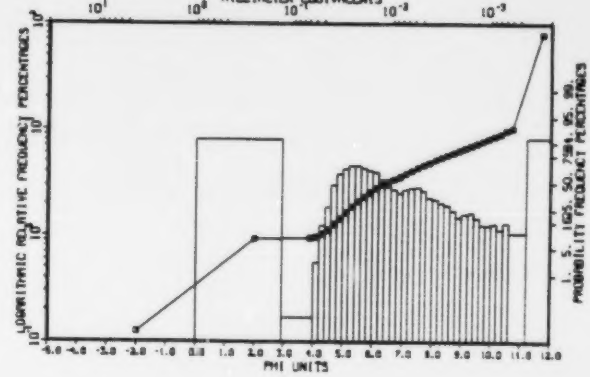

83028 CA1.1 659.5-660 CM.
SAMPLE NUMBER 3789
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS


83028 CA1.1 685-686 CM.
SAMPLE NUMBER 3790
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

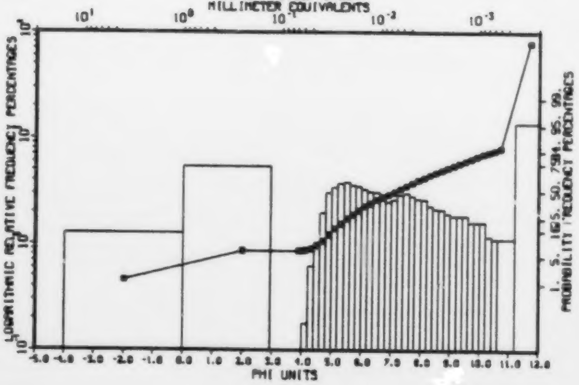
83028 CM1.2 3-4 CM.
SAMPLE NUMBER 3791
MILLIMETER EQUIVALENTS



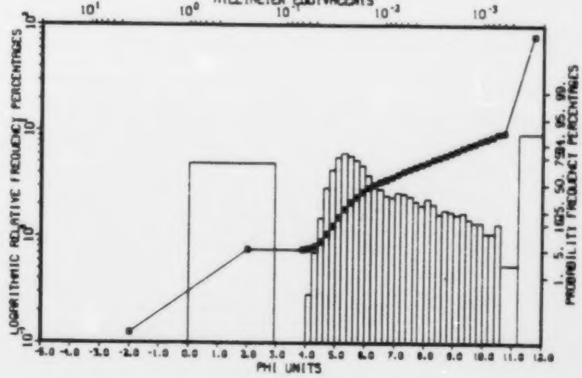
83028 CM1.2 20-21 CM.
SAMPLE NUMBER 3792
MILLIMETER EQUIVALENTS



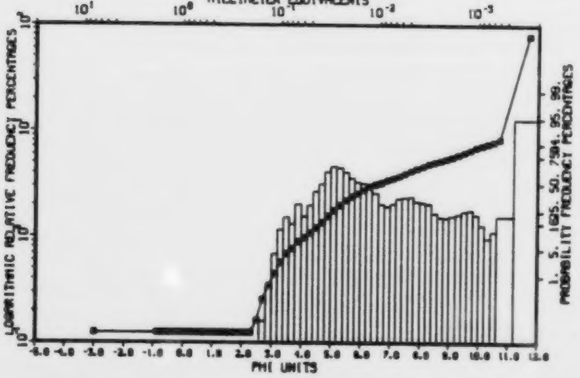
83028 CM1.2 40-41 CM.
SAMPLE NUMBER 3793
MILLIMETER EQUIVALENTS



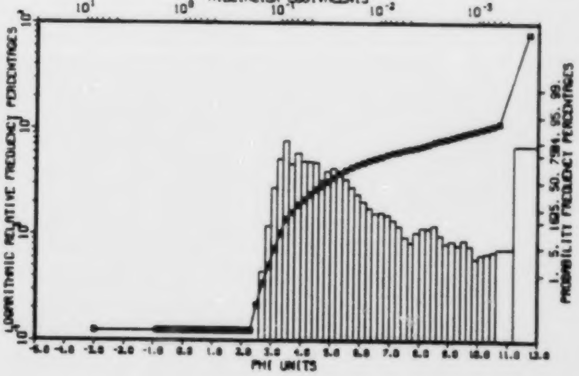
83028 CM1.2 110-111 CM.
SAMPLE NUMBER 3795
MILLIMETER EQUIVALENTS

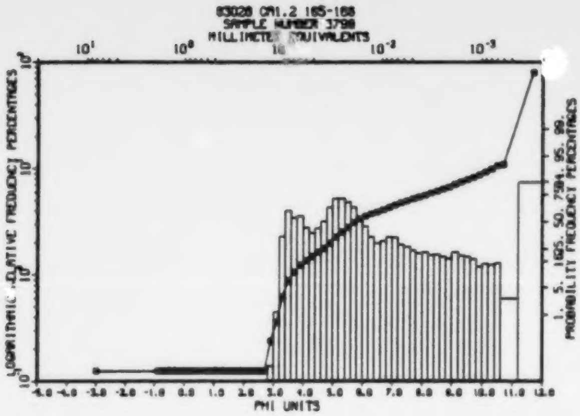


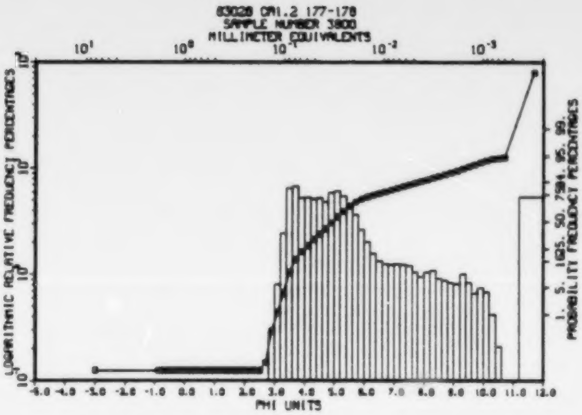
83028 CM1.2 130-131 CM.
SAMPLE NUMBER 3797
MILLIMETER EQUIVALENTS

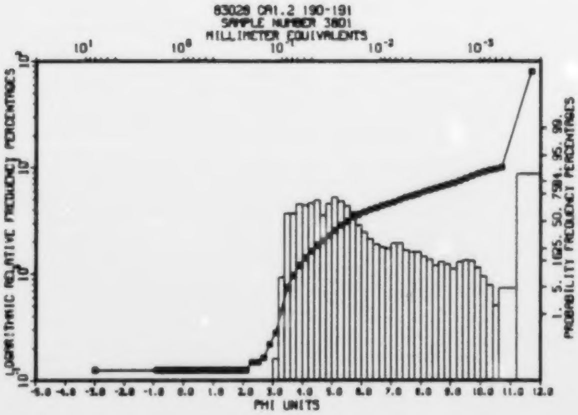


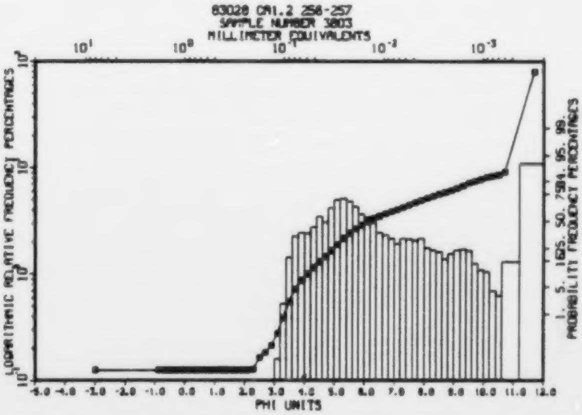
83028 CM1.2 156-157 CM. 83028
SAMPLE NUMBER 3798
MILLIMETER EQUIVALENTS

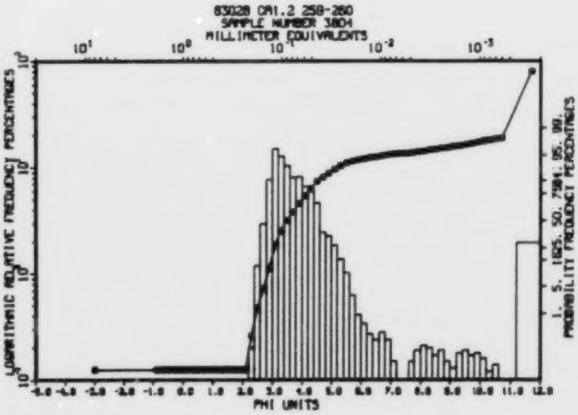


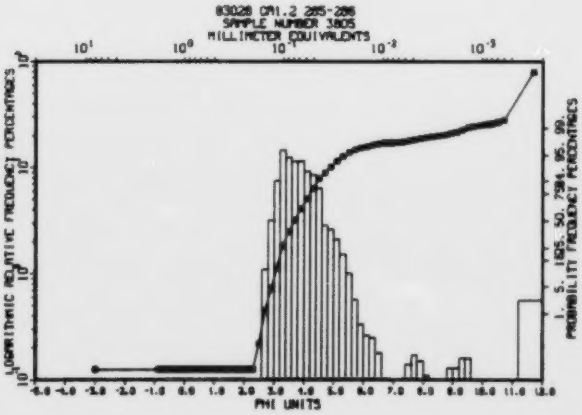

83028 CA1.2 165-168
SAMPLE NUMBER 3798
MILLIMETER EQUIVALENTS

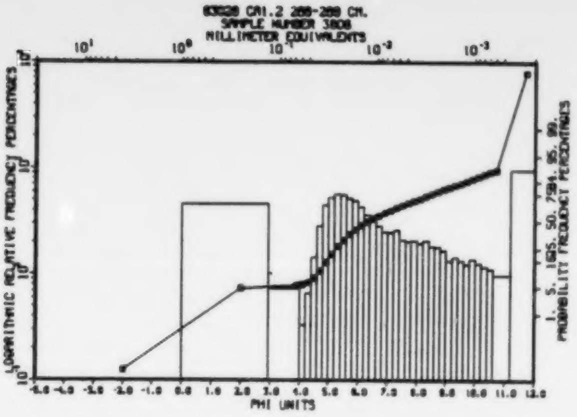

83028 CA1.2 177-178
SAMPLE NUMBER 3800
MILLIMETER EQUIVALENTS

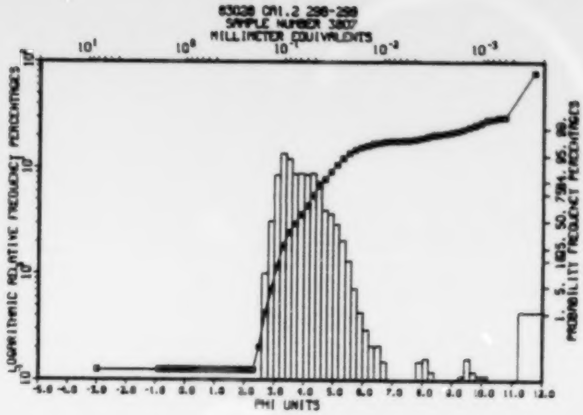

83028 CA1.2 190-191
SAMPLE NUMBER 3801
MILLIMETER EQUIVALENTS

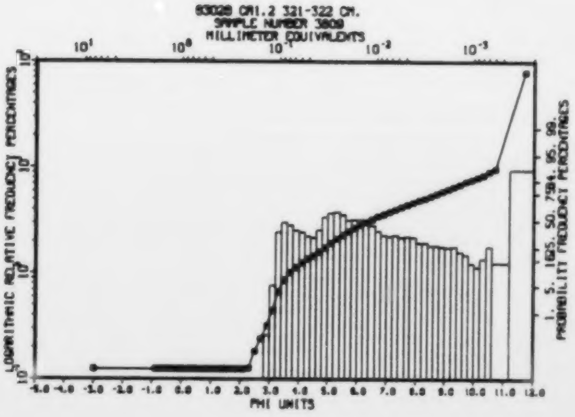

83028 CA1.2 256-257
SAMPLE NUMBER 3803
MILLIMETER EQUIVALENTS

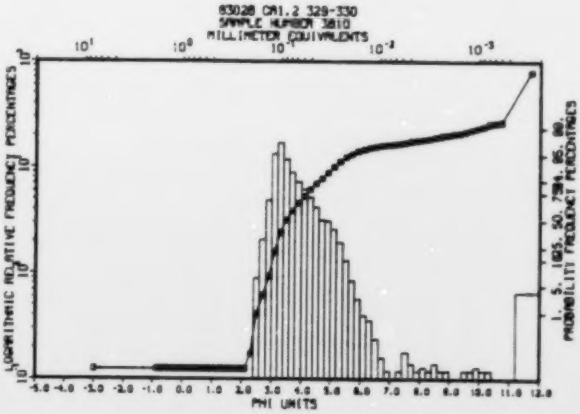

83028 CA1.2 258-260
SAMPLE NUMBER 3804
MILLIMETER EQUIVALENTS

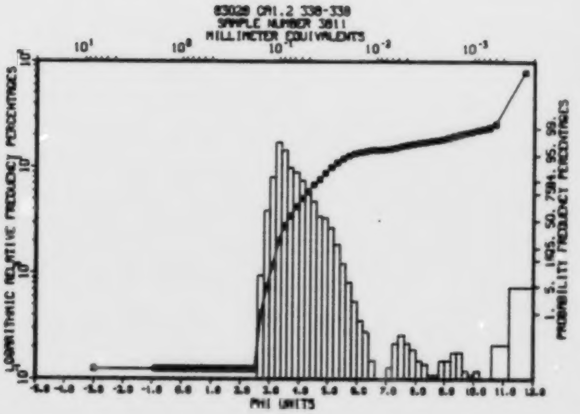

83028 CA1.2 285-286
SAMPLE NUMBER 3805
MILLIMETER EQUIVALENTS

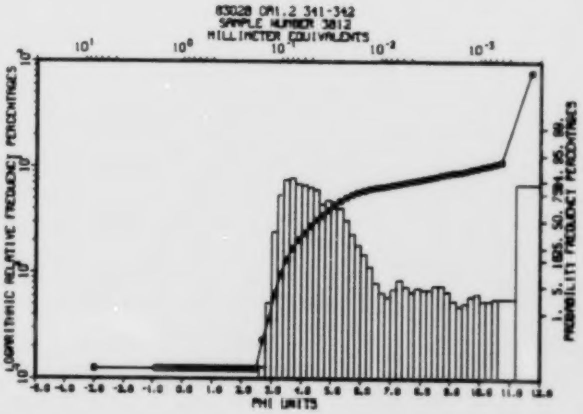

83028 CM1.2 288-289 CM.
SAMPLE NUMBER 3806
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


83028 CM1.2 298-299
SAMPLE NUMBER 3807
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

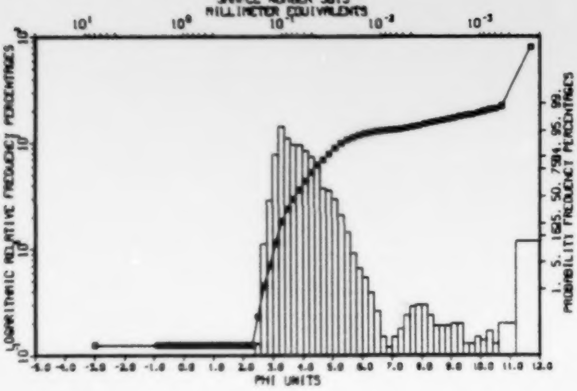

83028 CM1.2 321-322 CM.
SAMPLE NUMBER 3809
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


83028 CM1.2 329-330
SAMPLE NUMBER 3810
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

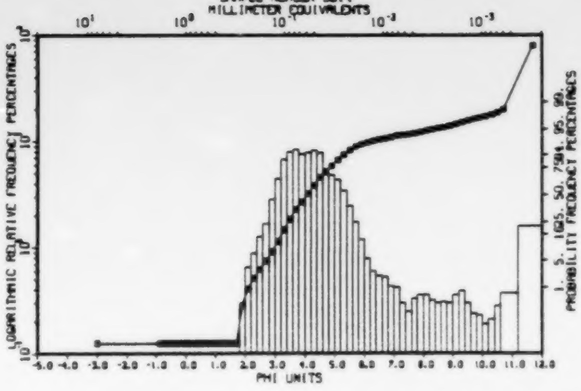

83028 CM1.2 338-339
SAMPLE NUMBER 3811
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


83028 CM1.2 341-342
SAMPLE NUMBER 3812
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

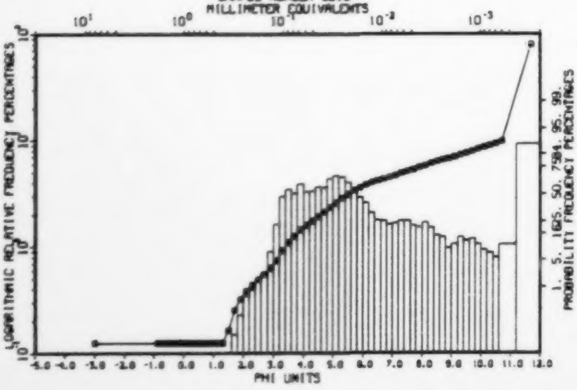
83028 CA1.2 344-345 CM.
SAMPLE NUMBER 3813



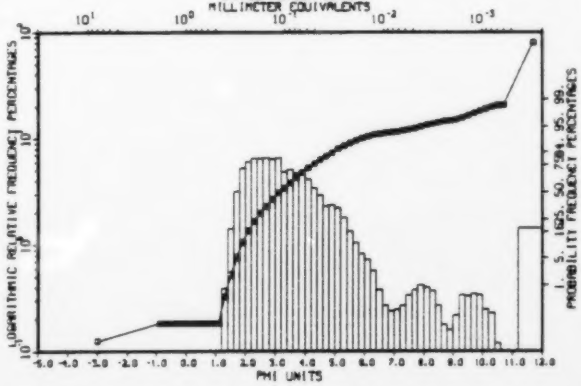
83028 CA1.2 347-348 CM.
SAMPLE NUMBER 3814



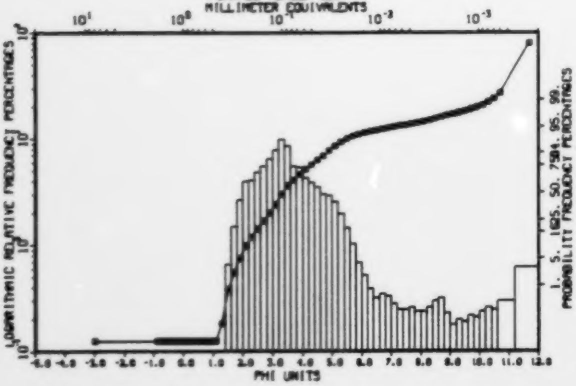
83028 CA1.2 387-388 CM.
SAMPLE NUMBER 3815



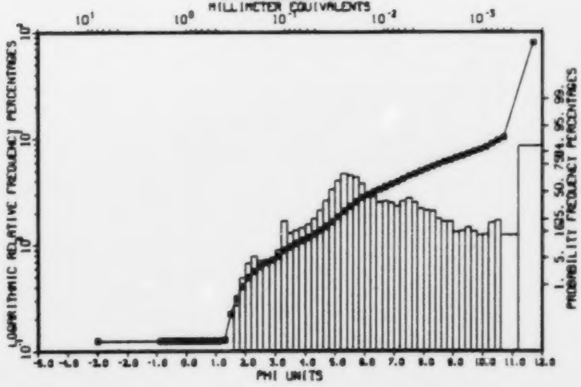
83028 CA1.2 382-383 CM.
SAMPLE NUMBER 3816

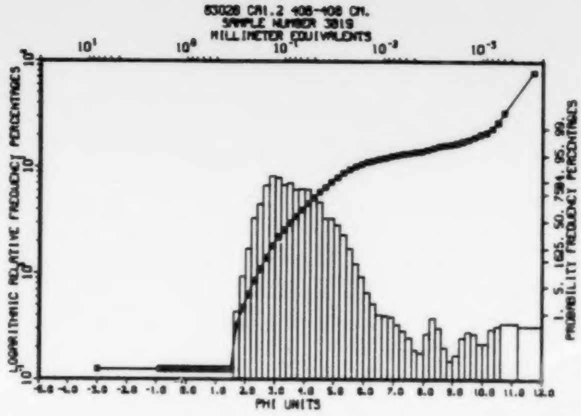


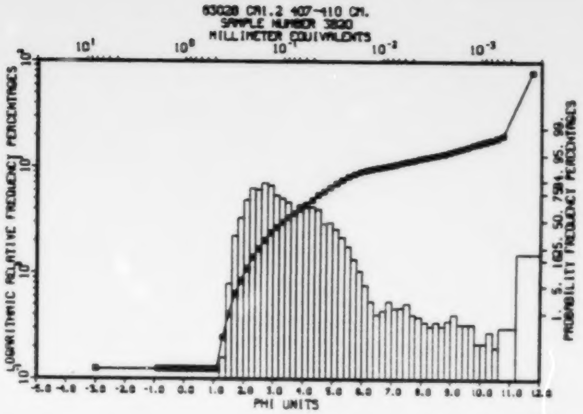
83028 CA1.2 386-388 CM.
SAMPLE NUMBER 3817

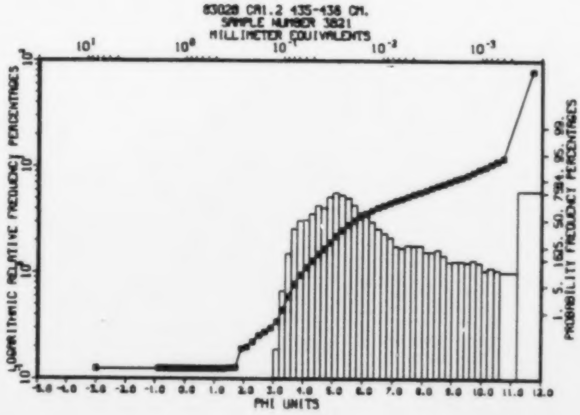


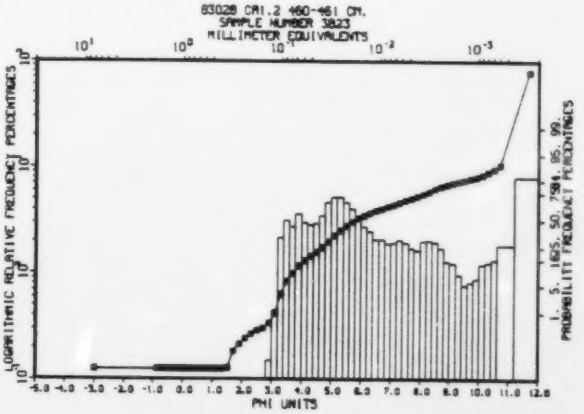
83028 CA1.2 395-396 CM.
SAMPLE NUMBER 3818

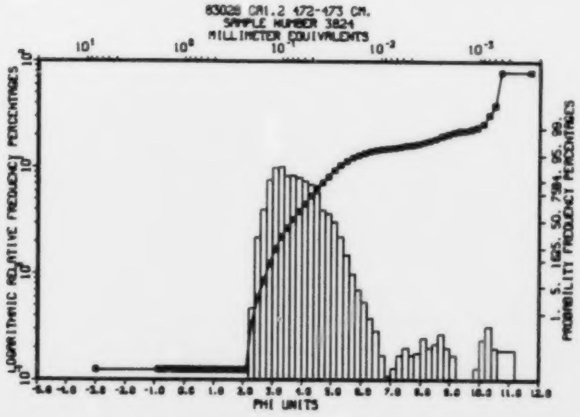


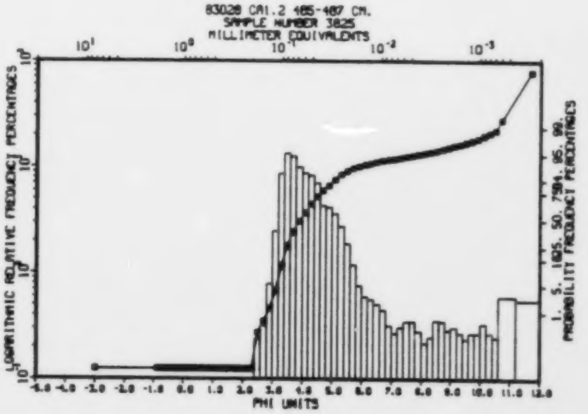

83028 CA1.2 406-408 CM.
SAMPLE NUMBER 3819
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

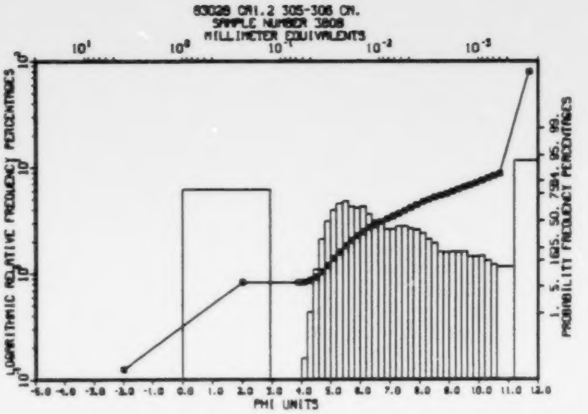

83028 CA1.2 407-410 CM.
SAMPLE NUMBER 3820
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

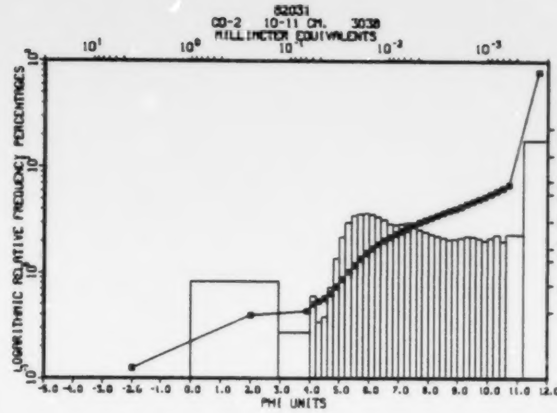

83028 CA1.2 435-438 CM.
SAMPLE NUMBER 3821
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

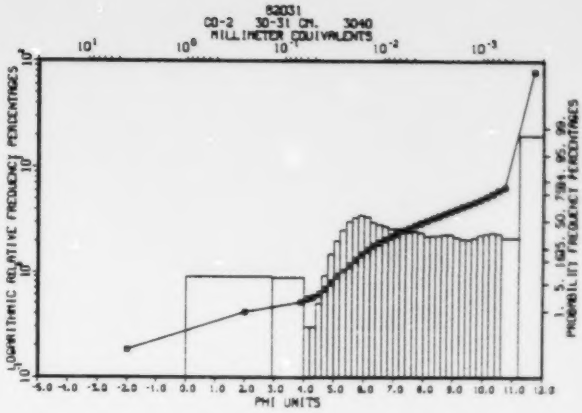

83028 CA1.2 460-461 CM.
SAMPLE NUMBER 3823
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

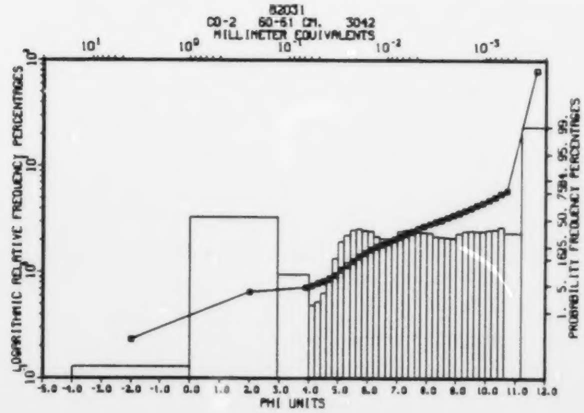

83028 CA1.2 472-473 CM.
SAMPLE NUMBER 3824
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

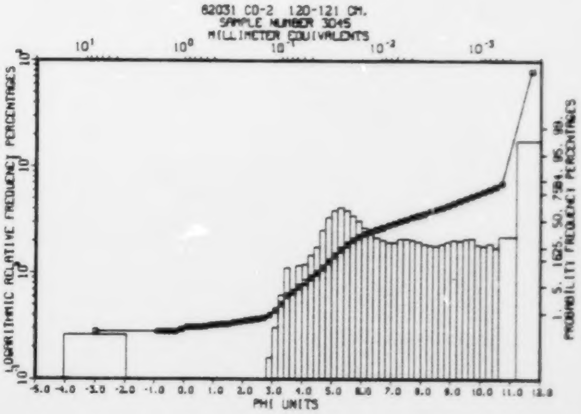

83028 CA1.2 485-487 CM.
SAMPLE NUMBER 3825
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

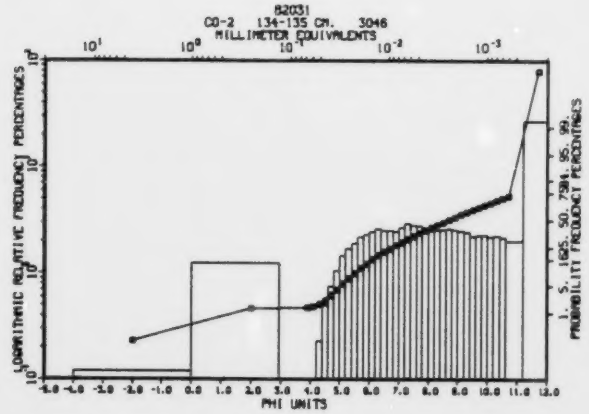

83028 CR1.2 305-306 CM.
SAMPLE NUMBER 3808
MILLIMETER EQUIVALENTS
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^{2}
10^{1}
10^{0}
10^{-1}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

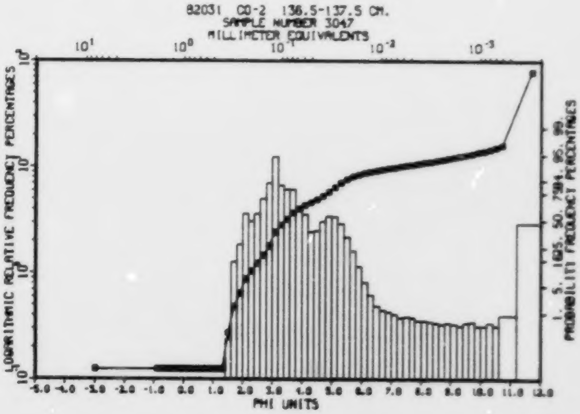

82031
CO-2 10-11 CM. 3038
MILLIMETER EQUIVALENTS

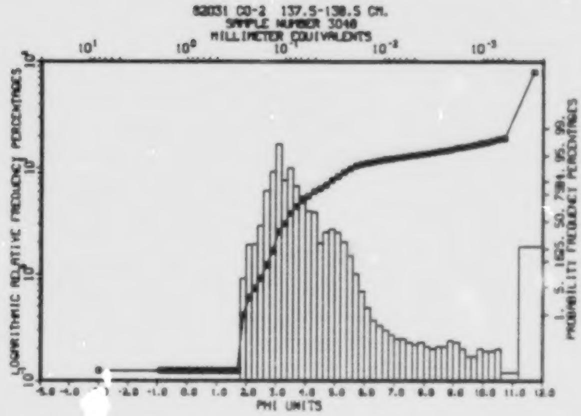

82031
CO-2 30-31 CM. 3040
MILLIMETER EQUIVALENTS

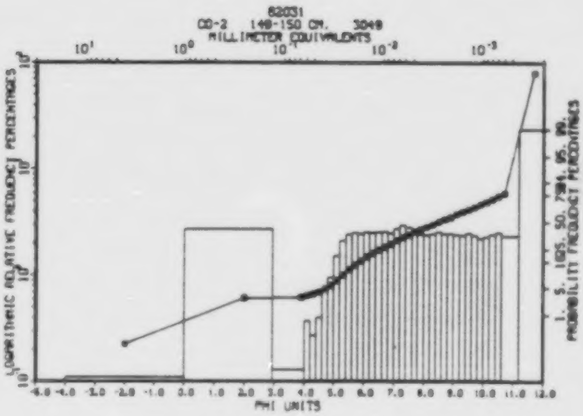

82031
CO-2 60-61 CM. 3042
MILLIMETER EQUIVALENTS

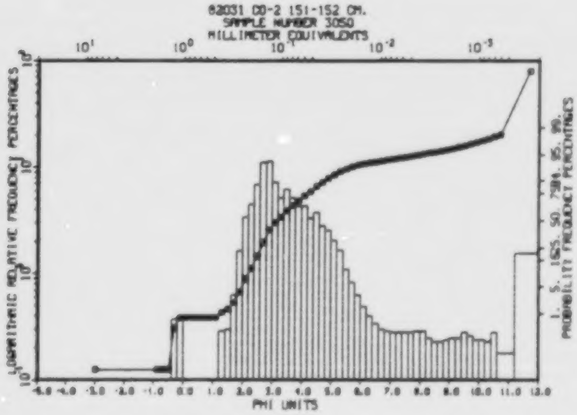

82031 CO-2 120-121 CM.
SAMPLE NUMBER 3045
MILLIMETER EQUIVALENTS

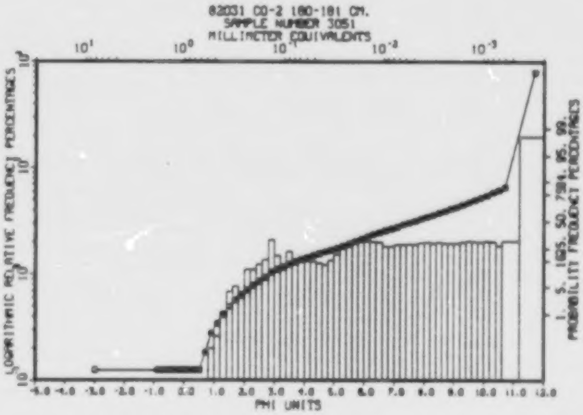

82031
CO-2 134-135 CM. 3046
MILLIMETER EQUIVALENTS

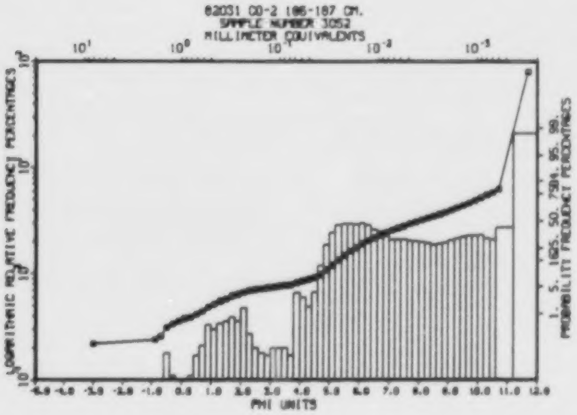

82031 CO-2 136.5-137.5 CM.
SAMPLE NUMBER 3047
MILLIMETER EQUIVALENTS

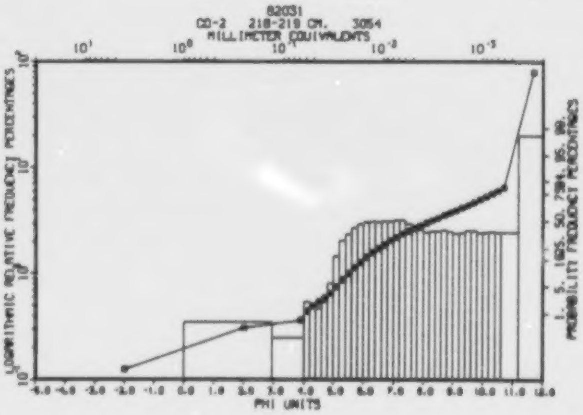

82031 CO-2 137.5-138.5 CM.
SAMPLE NUMBER 3048

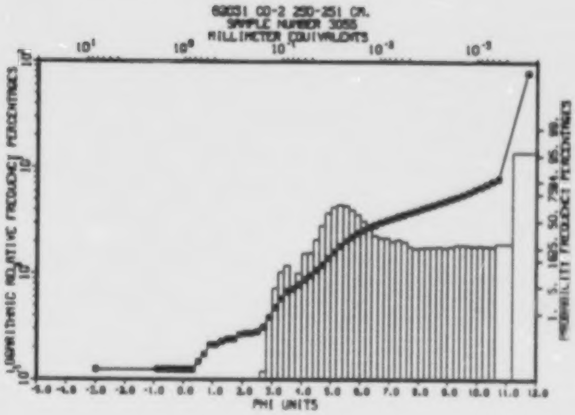

82031
CO-2 149-150 CM. 3049

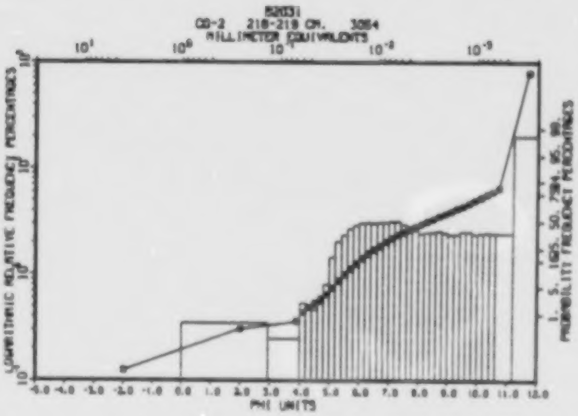

82031 CO-2 151-152 CM.
SAMPLE NUMBER 3050

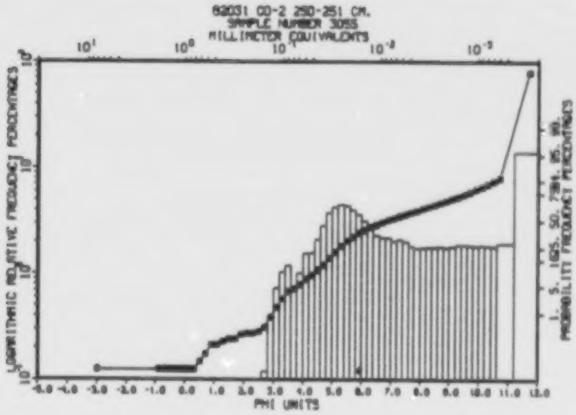

82031 CO-2 180-181 CM.
SAMPLE NUMBER 3051

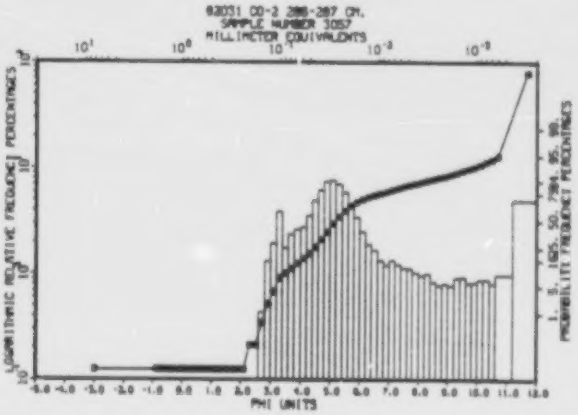

82031 CO-2 186-187 CM.
SAMPLE NUMBER 3052

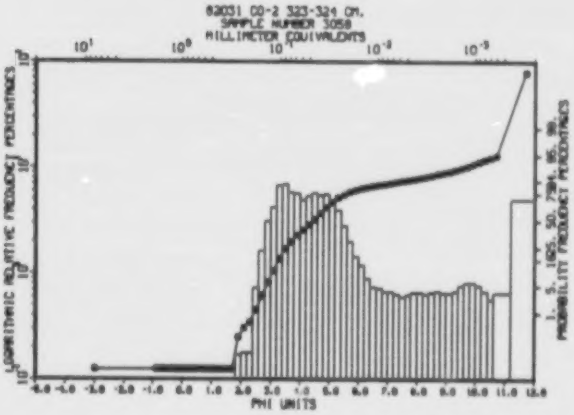

82031
CO-2 218-219 CM. 3054

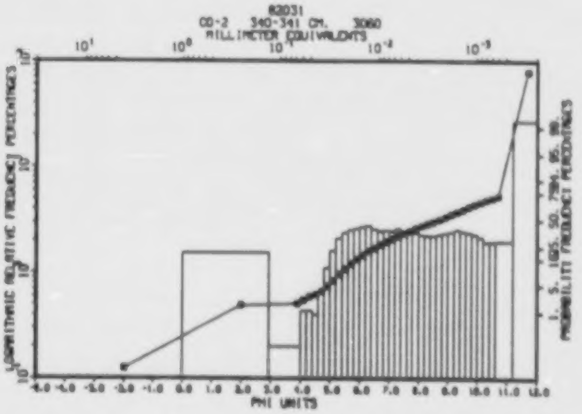

82031 CO-2 250-251 CM.
SAMPLE NUMBER 3055
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

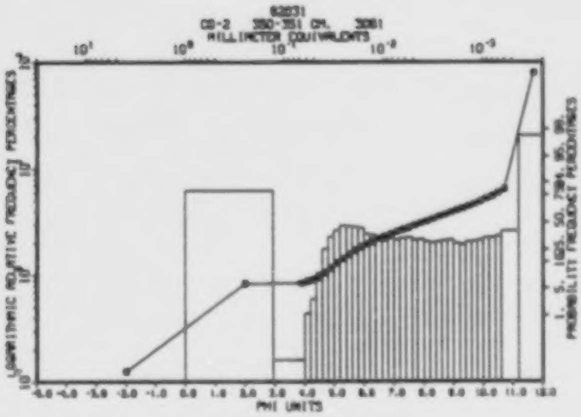

82031
CO-2 218-219 CM. 3054
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

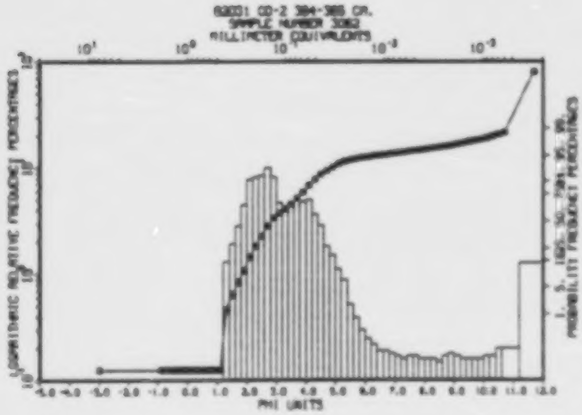

82031 CO-2 250-251 CM.
SAMPLE NUMBER 3055
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

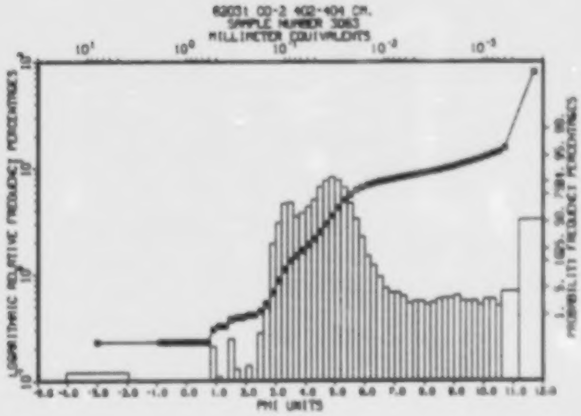

82031 CO-2 286-287 CM.
SAMPLE NUMBER 3057
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

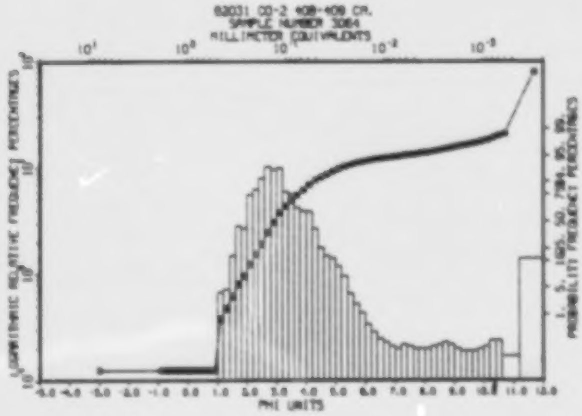

82031 CO-2 323-324 CM.
SAMPLE NUMBER 3058
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

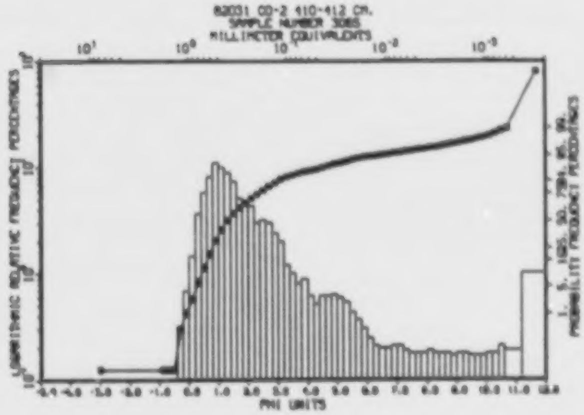

82031
CO-2 340-341 CM. 3060
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

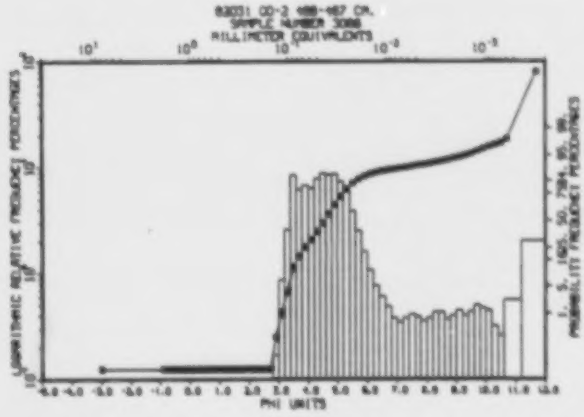

82031
CD-2 350-351 CM. 3061
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS


82031 CD-2 384-385 CM.
SAMPLE NUMBER 3062
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

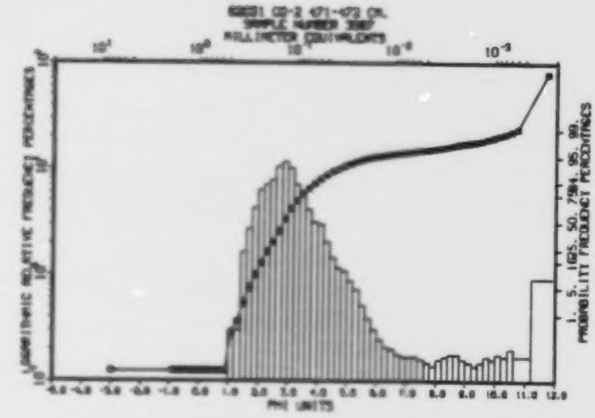

82031 CD-2 402-404 CM.
SAMPLE NUMBER 3063
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS


82031 CD-2 408-409 CM.
SAMPLE NUMBER 3064
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

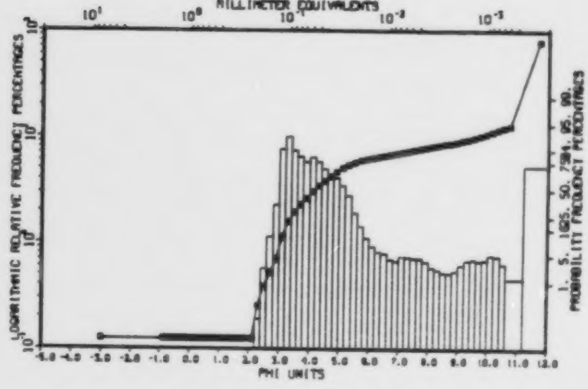

82031 CD-2 410-412 CM.
SAMPLE NUMBER 3065
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS


82031 CD-2 466-467 CM.
SAMPLE NUMBER 3066
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

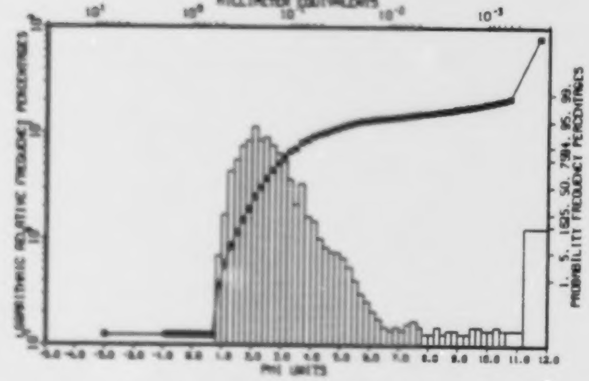
82031 CO-2 471-472 CM.
SAMPLE NUMBER 3067



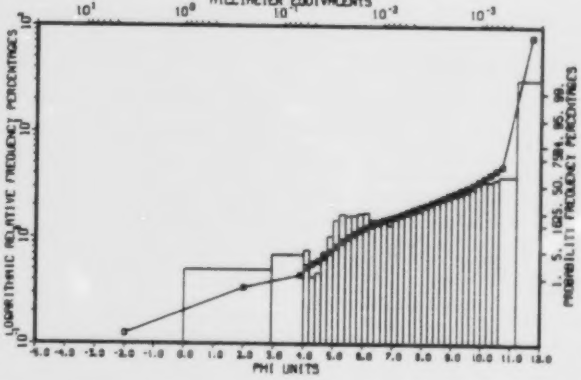
82031 CO-2 482.5-483.5 CM.
SAMPLE NUMBER 3068



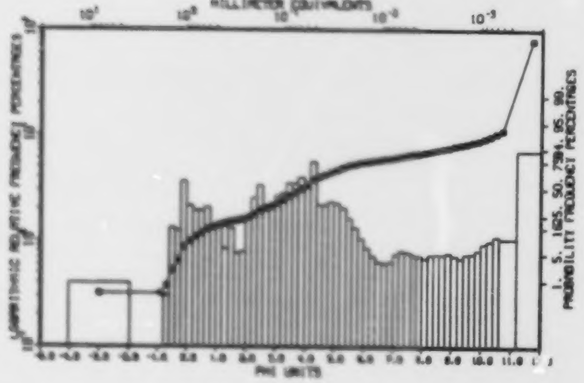
82031 CO-2 488-489 CM.
SAMPLE NUMBER 3069



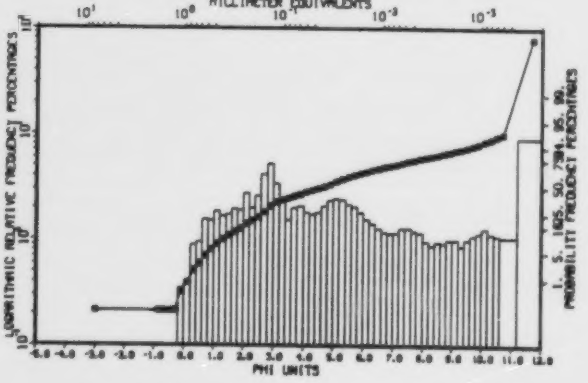
82031
CO-2 499-500 CM. 3071

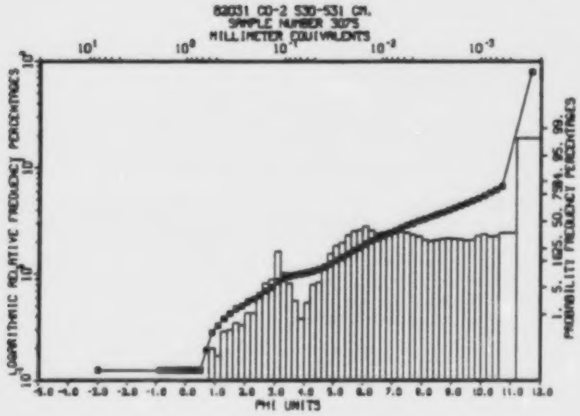


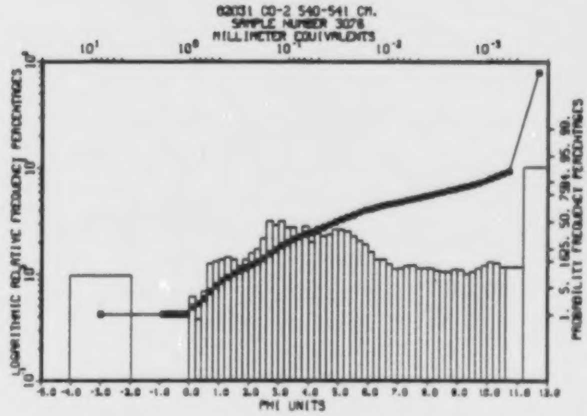
82031 CO-2 502-503 CM.
SAMPLE NUMBER 3072

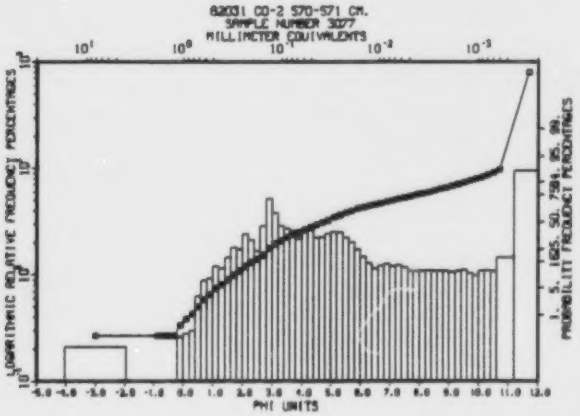


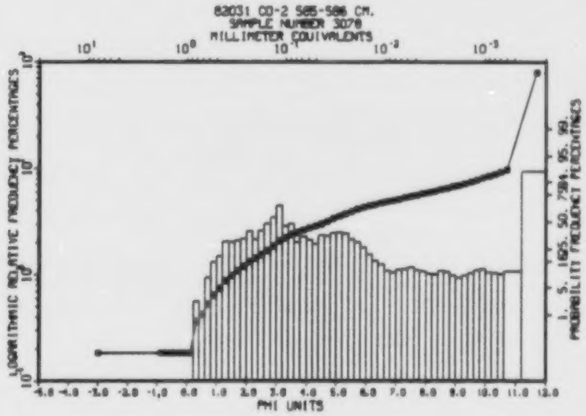
82031 CO-2 524-525 CM.
SAMPLE NUMBER 3074

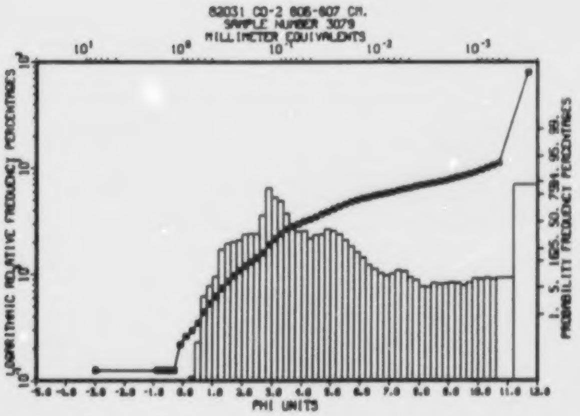


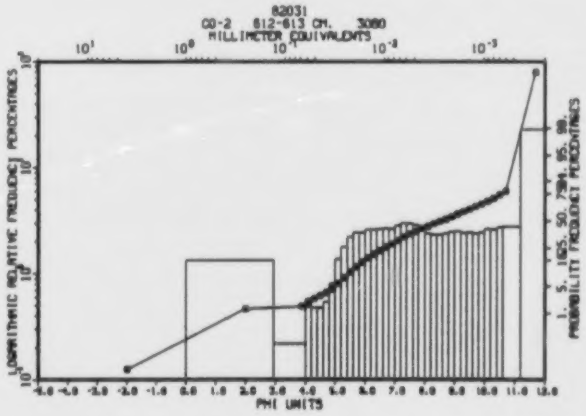

82031 CO-2 530-531 CM.
SAMPLE NUMBER 3075
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

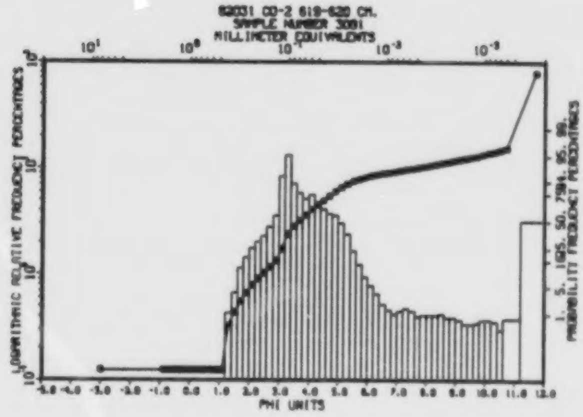

82031 CO-2 540-541 CM.
SAMPLE NUMBER 3076
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

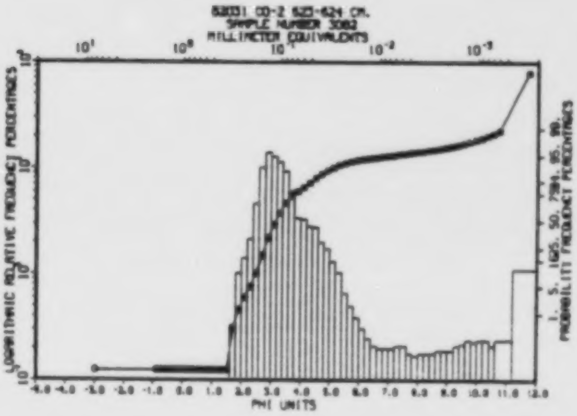

82031 CO-2 570-571 CM.
SAMPLE NUMBER 3077
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

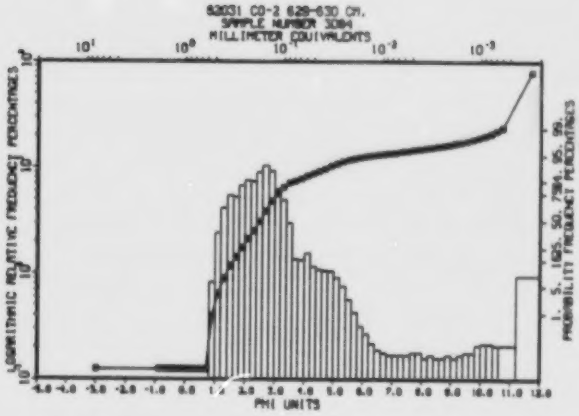

82031 CO-2 585-586 CM.
SAMPLE NUMBER 3078
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

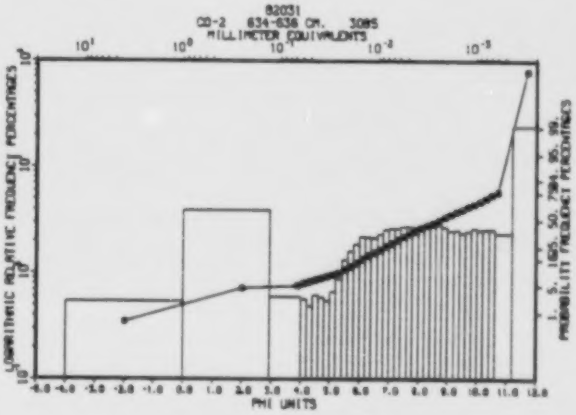

82031 CO-2 606-607 CM.
SAMPLE NUMBER 3079
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

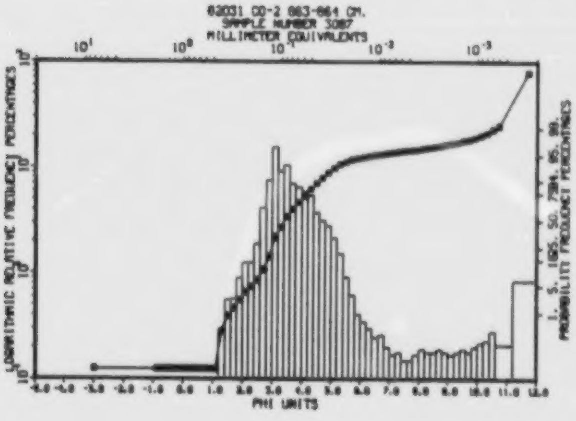

82031
CO-2 612-613 CM. 3080
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

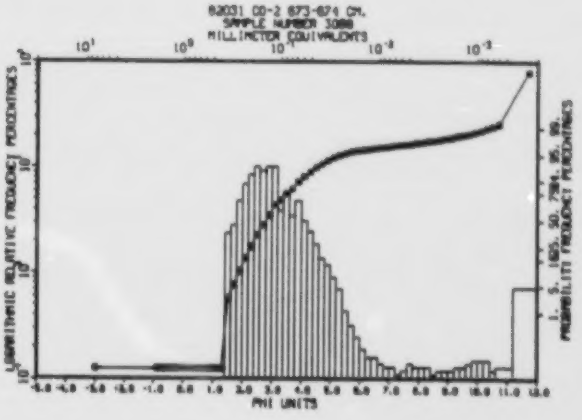

82031 CO-2 619-620 CM.
SAMPLE NUMBER 3081
MILLIMETER EQUIVALENTS
10^{1} 10^{0} 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

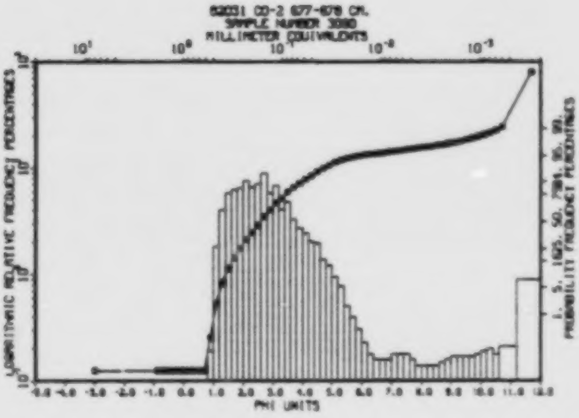

82031 CO-2 623-624 CM.
SAMPLE NUMBER 3082
MILLIMETER EQUIVALENTS
10^{1} 10^{0} 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

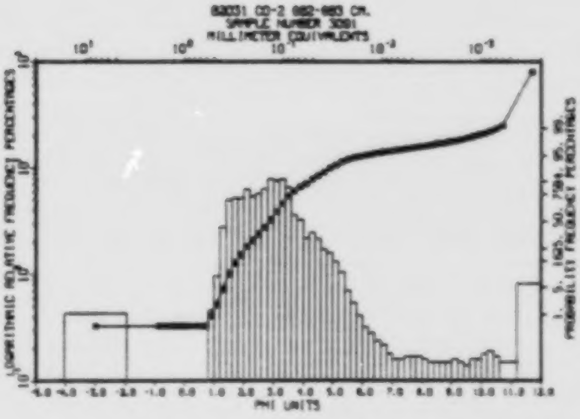

82031 CO-2 628-630 CM.
SAMPLE NUMBER 3084
MILLIMETER EQUIVALENTS
10^{1} 10^{0} 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

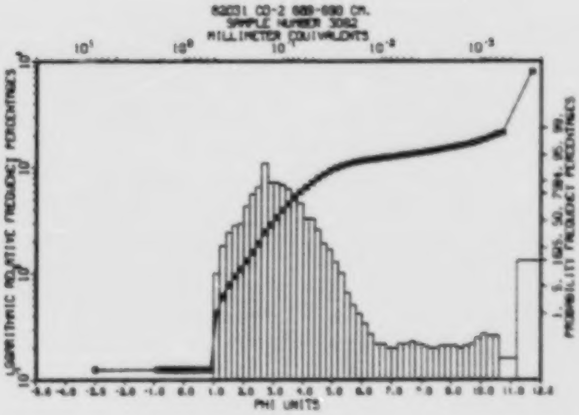

82031
CO-2 634-636 CM. 3085
MILLIMETER EQUIVALENTS
10^{1} 10^{0} 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

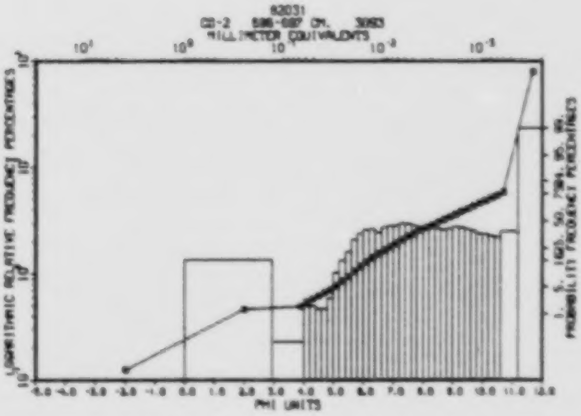

82031 CO-2 663-664 CM.
SAMPLE NUMBER 3087
MILLIMETER EQUIVALENTS
10^{1} 10^{0} 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

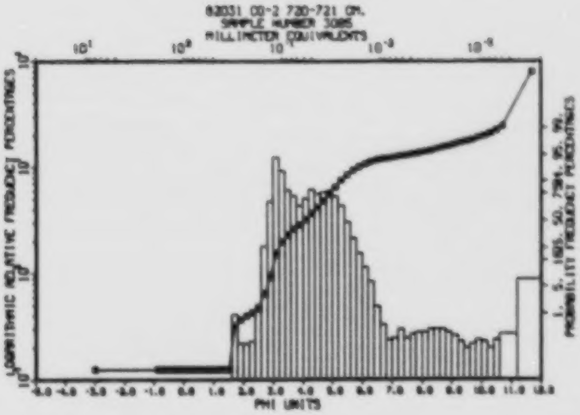

82031 CO-2 673-674 CM.
SAMPLE NUMBER 3088
MILLIMETER EQUIVALENTS
10^{1} 10^{0} 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

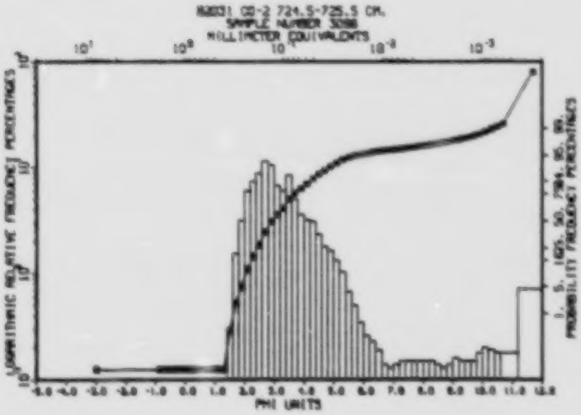

82031 CD-2 677-678 CM.
SAMPLE NUMBER 3080
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS


82031 CD-2 682-683 CM.
SAMPLE NUMBER 3081
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

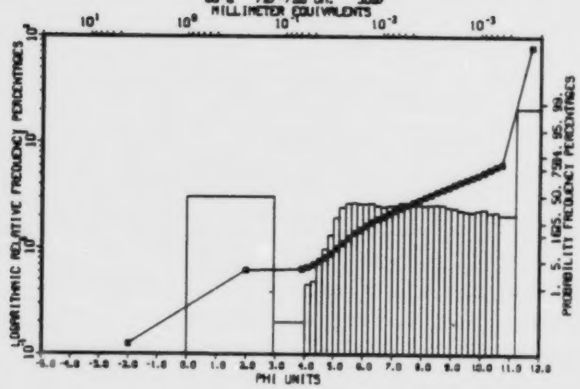

82031 CD-2 689-690 CM.
SAMPLE NUMBER 3082
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS


82031
CD-2 686-687 CM. 3083
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

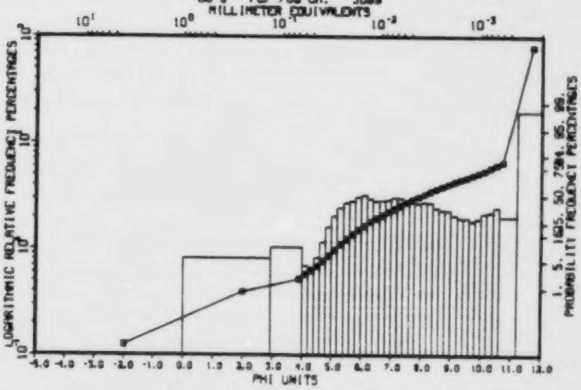

82031 CD-2 720-721 CM.
SAMPLE NUMBER 3085
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS


82031 CD-2 724.5-725.5 CM.
SAMPLE NUMBER 3086
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

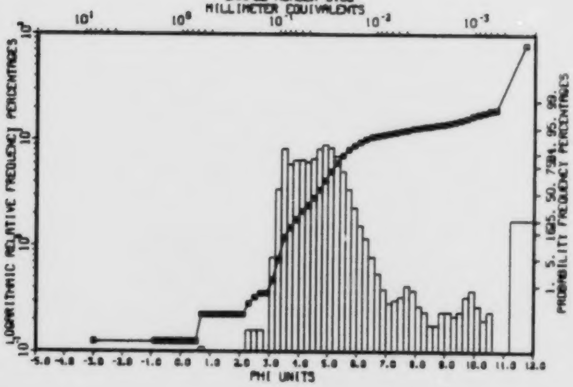
82031
CO-2 727-728 CM. 3097



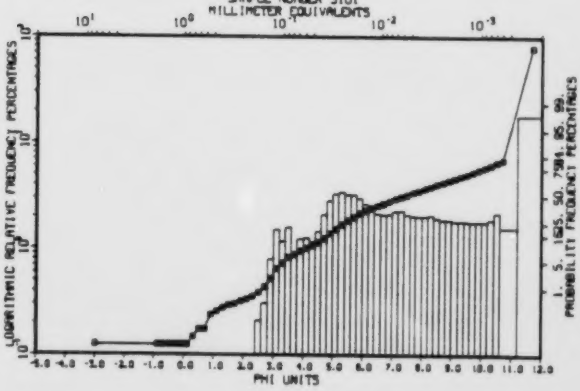
82031
CO-2 767-768 CM. 3099



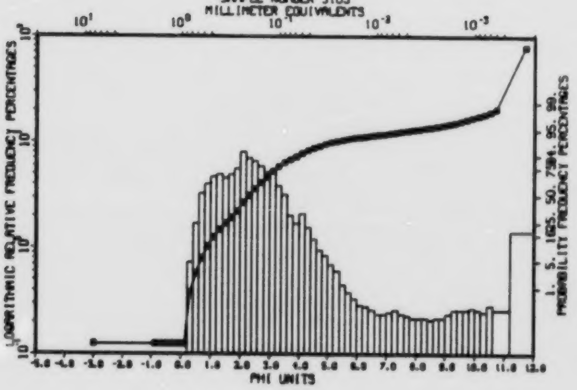
82031 CO-2 787-788 CM.
SAMPLE NUMBER 3100

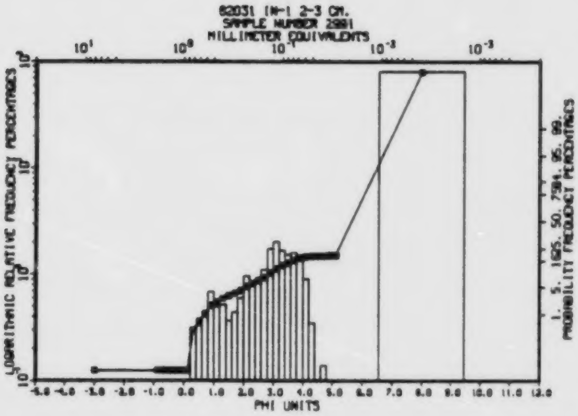


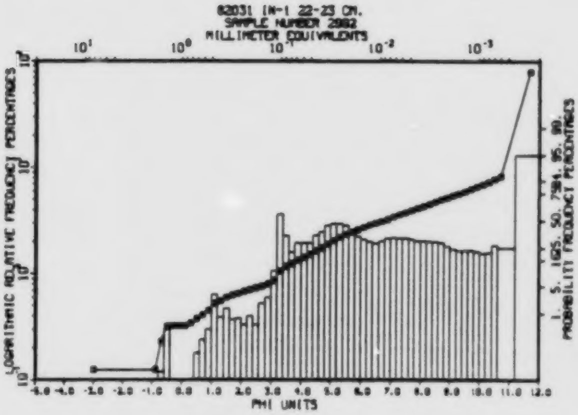
82031 CO-2 807-808 CM.
SAMPLE NUMBER 3101

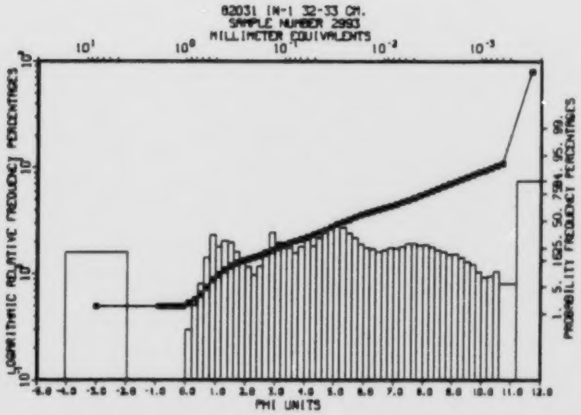


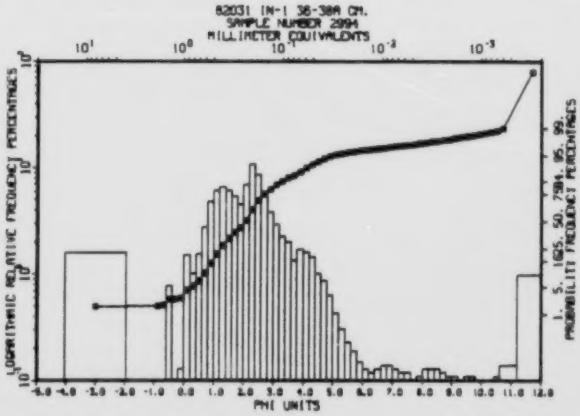
82031 CO-2 822-826 CM.
SAMPLE NUMBER 3103

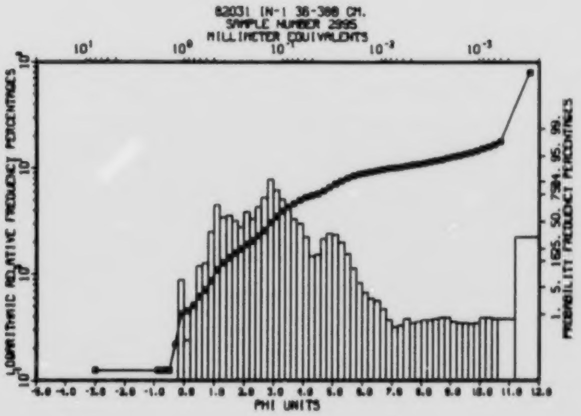


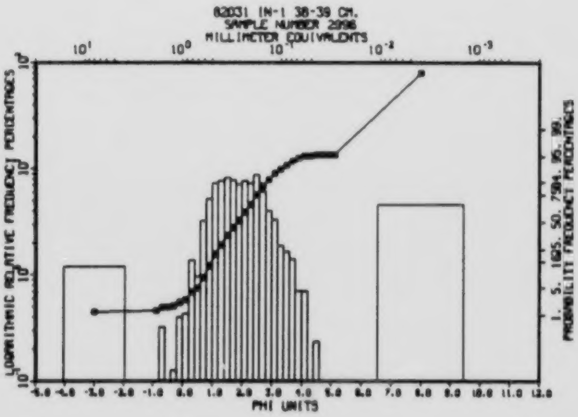

82031 IN-1 2-3 CM.
SAMPLE NUMBER 2991
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^0 10^1 10^2
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


82031 IN-1 22-23 CM.
SAMPLE NUMBER 2992
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^0 10^1 10^2
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

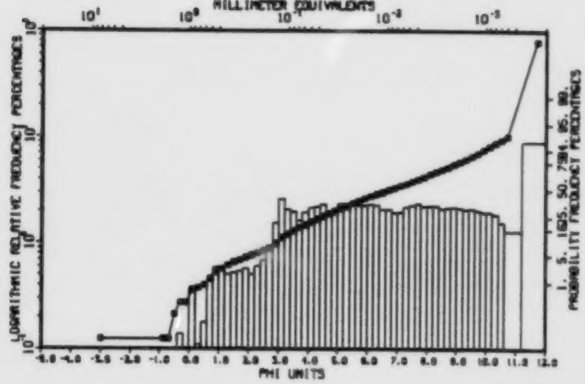

82031 IN-1 32-33 CM.
SAMPLE NUMBER 2993
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^0 10^1 10^2
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


82031 IN-1 38-38A CM.
SAMPLE NUMBER 2994
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^0 10^1 10^2
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

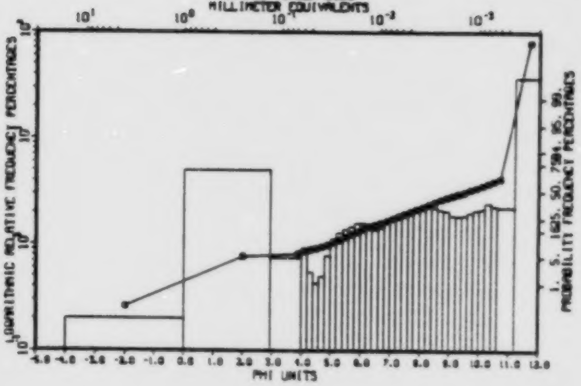

82031 IN-1 38-38B CM.
SAMPLE NUMBER 2995
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^0 10^1 10^2
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


82031 IN-1 38-39 CM.
SAMPLE NUMBER 2996
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^0 10^1 10^2
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

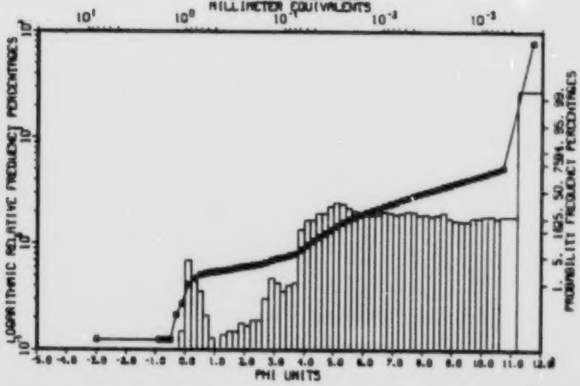
82031 IN-1 46-47 CM.
SAMPLE NUMBER 2997



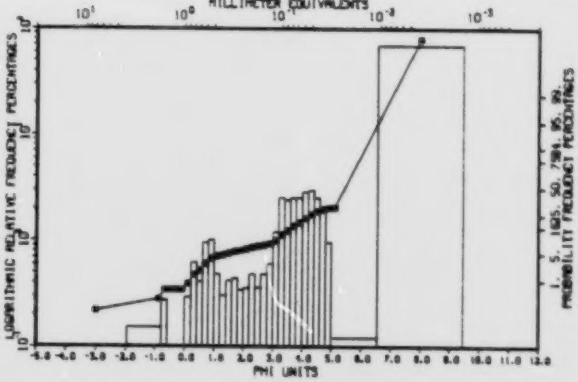
82031 IN-1 66-67 CM.
SAMPLE NUMBER 2998



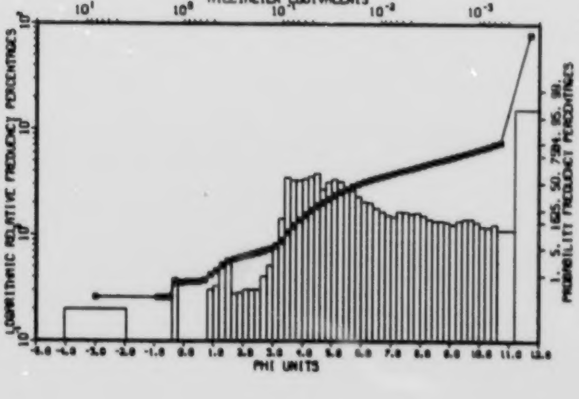
82031 IN-1 86-87 CM.
SAMPLE NUMBER 2999



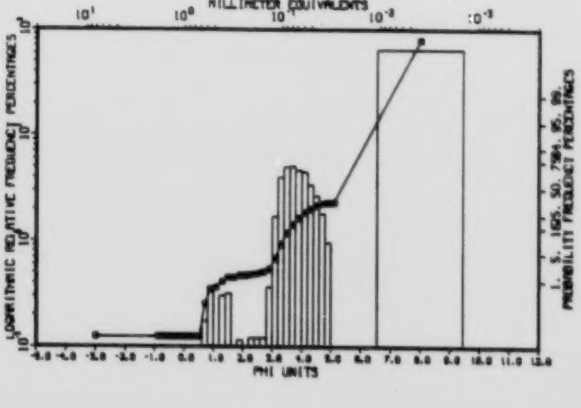
82031 IN-1 110-111 CM.
SAMPLE NUMBER 3000



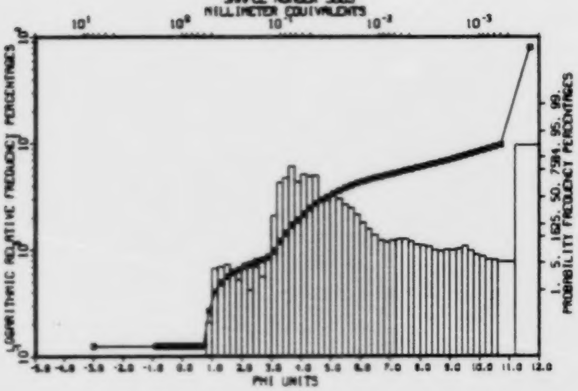
82031 IN-1 130-131 CM.
SAMPLE NUMBER 3001



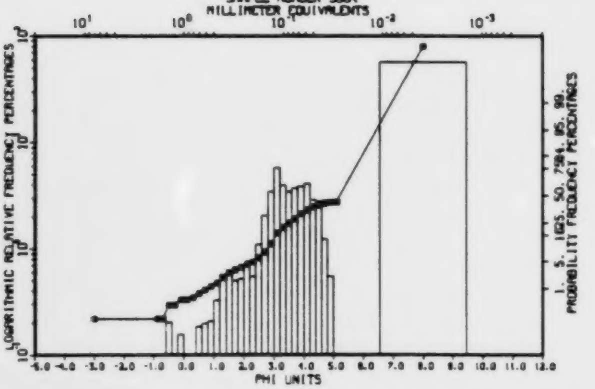
82031 IN-1 140-141 CM.
SAMPLE NUMBER 3002



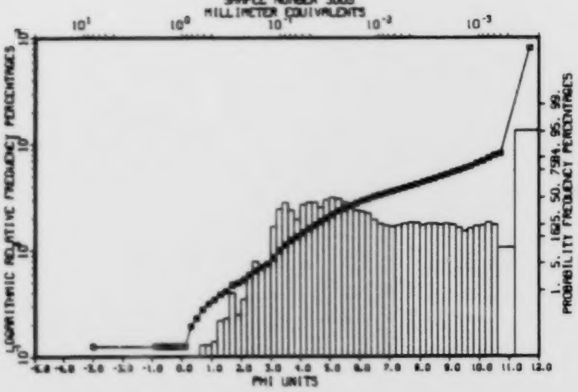
82031 IN-1 150-151 CM.
SAMPLE NUMBER 3003



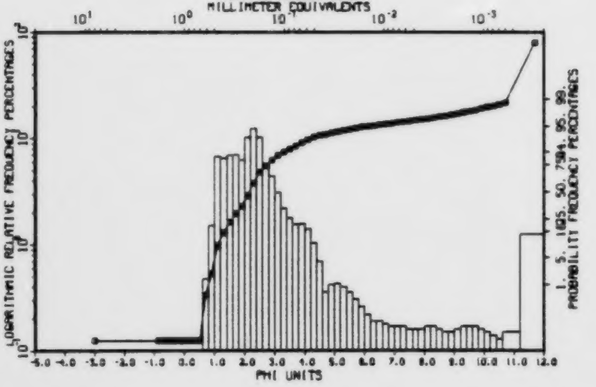
82031 IN-1 168-169 CM.
SAMPLE NUMBER 3004



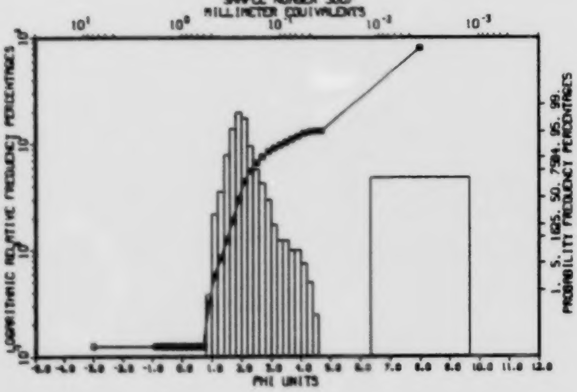
82031 IN-1 179-181 CM.
SAMPLE NUMBER 3005



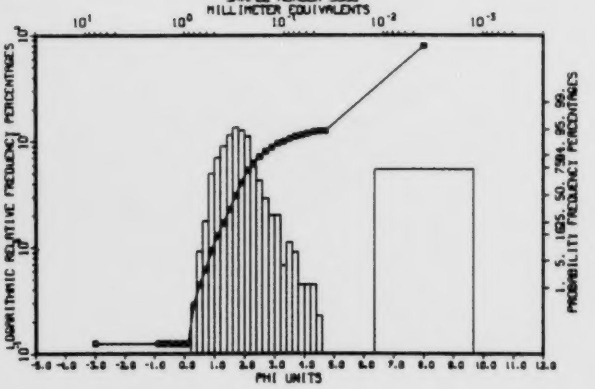
82031 IN-1 183-184 CM.
SAMPLE NUMBER 3006

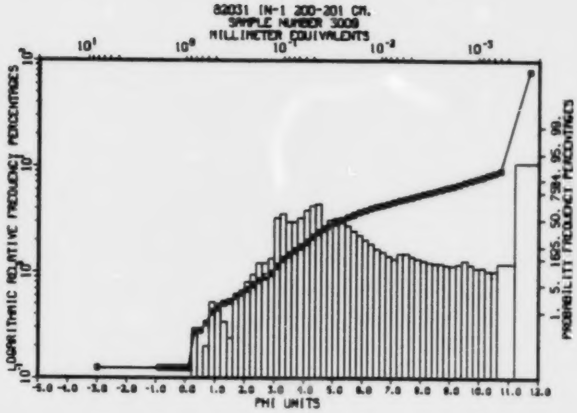


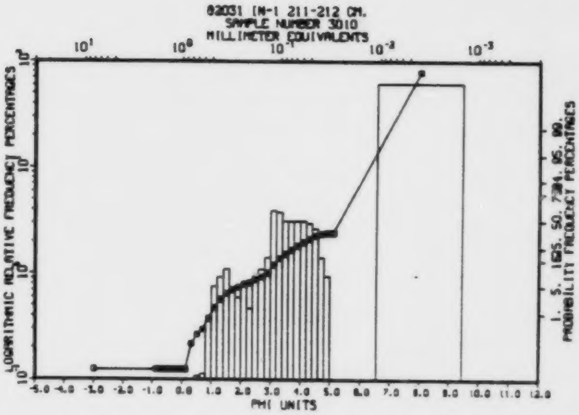
82031 IN-1 191-192 CM.
SAMPLE NUMBER 3007

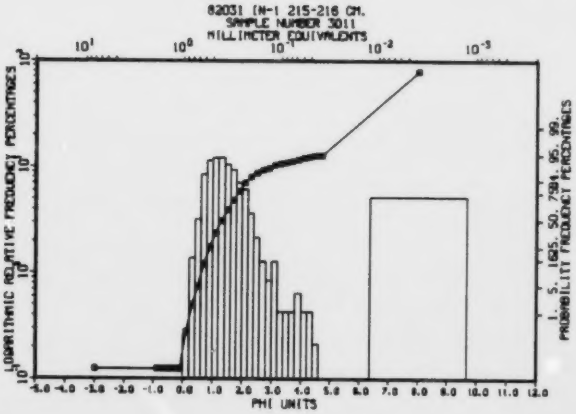


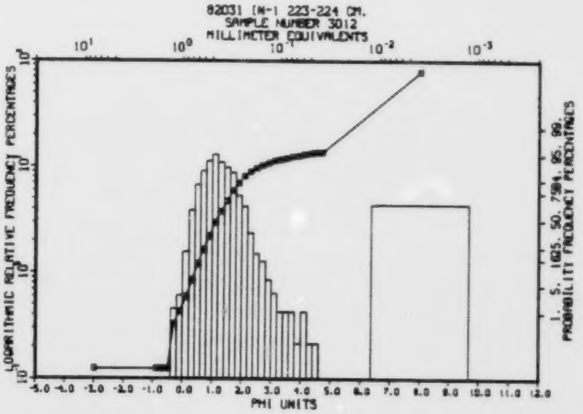
82031 IN-1 197-198 CM.
SAMPLE NUMBER 3008

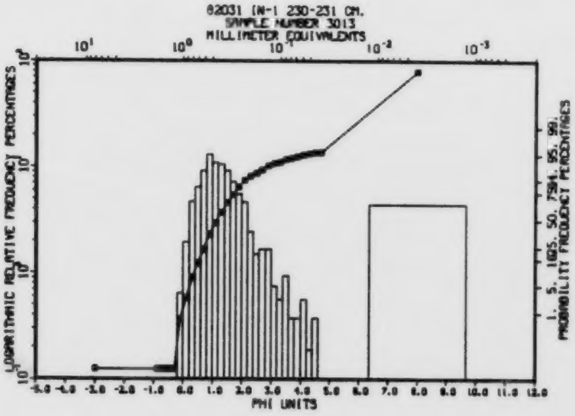


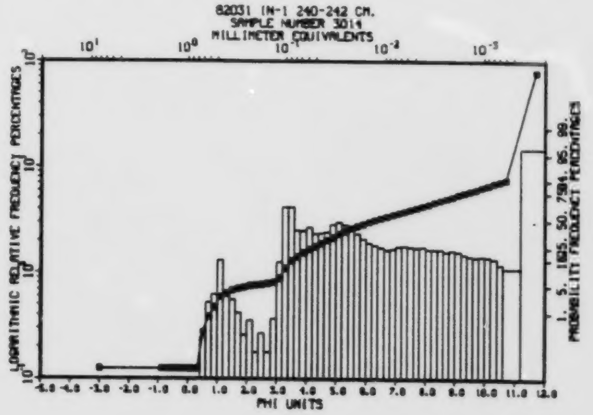

82031 IN-1 200-201 CM.
SAMPLE NUMBER 3009


82031 IN-1 211-212 CM.
SAMPLE NUMBER 3010

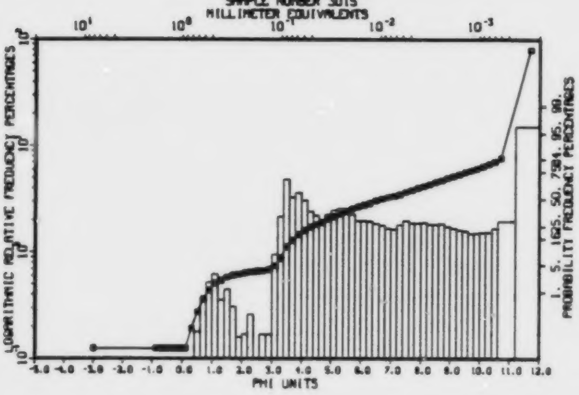

82031 IN-1 215-216 CM.
SAMPLE NUMBER 3011


82031 IN-1 223-224 CM.
SAMPLE NUMBER 3012

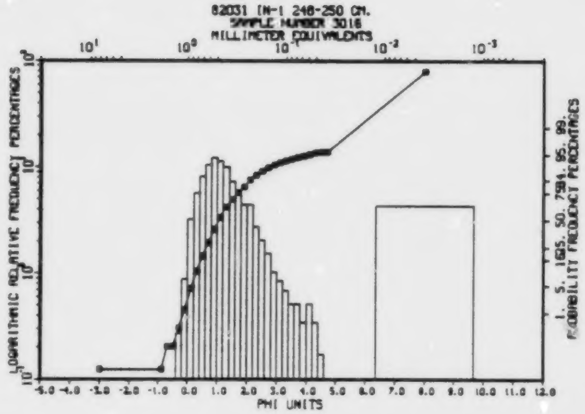

82031 IN-1 230-231 CM.
SAMPLE NUMBER 3013


82031 IN-1 240-242 CM.
SAMPLE NUMBER 3014

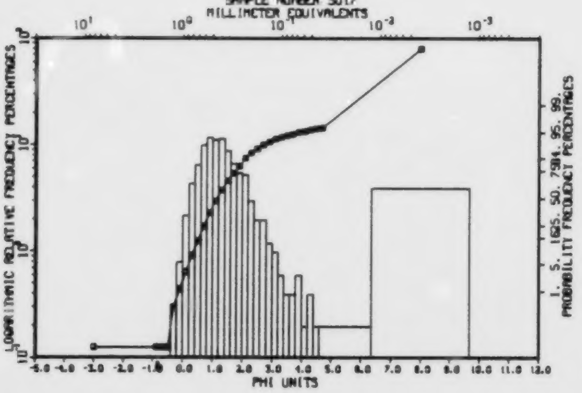
82031 IN-1 244-247 CM.
SAMPLE NUMBER 3015



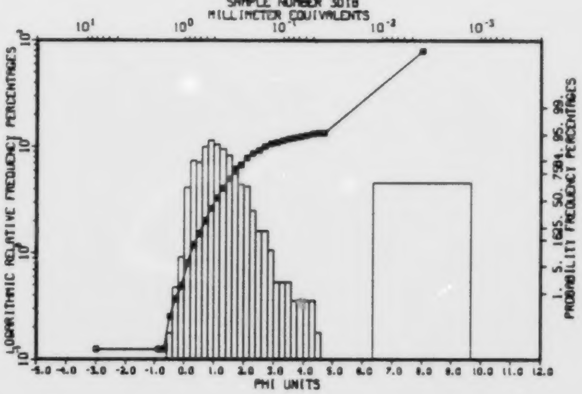
82031 IN-1 248-250 CM.
SAMPLE NUMBER 3016



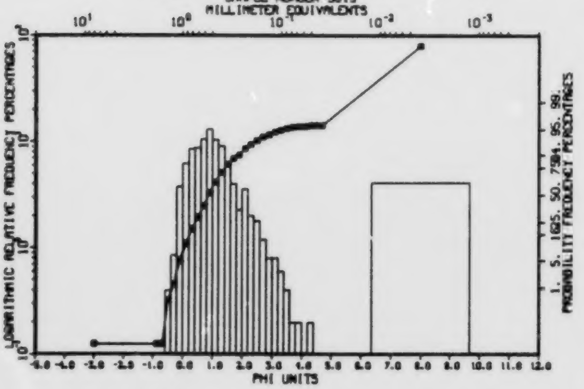
82031 IN-1 265-266 CM.
SAMPLE NUMBER 3017



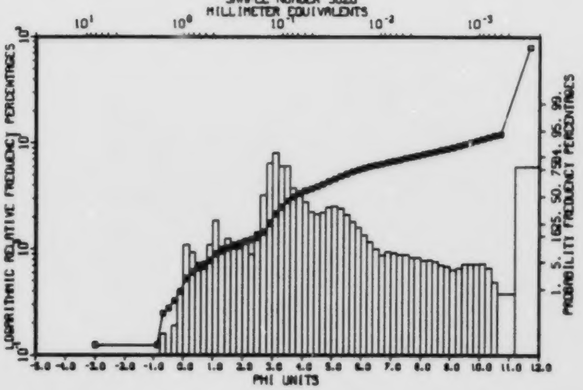
82031 IN-1 298-299 CM.
SAMPLE NUMBER 3018



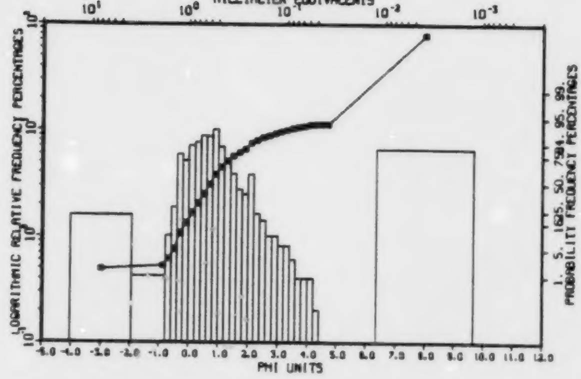
82031 IN-1 310-311 CM. J. SYVITSKI
SAMPLE NUMBER 3019



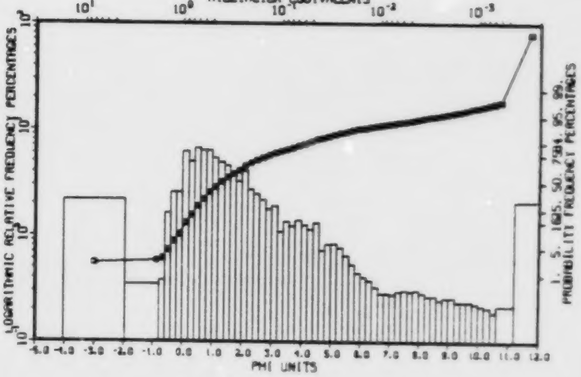
82031 IN-1 319-320 CM.
SAMPLE NUMBER 3020



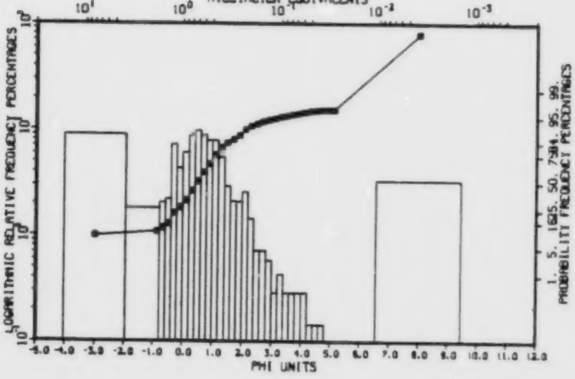
82031 IN-1 330-331 CM.
SAMPLE NUMBER 3021



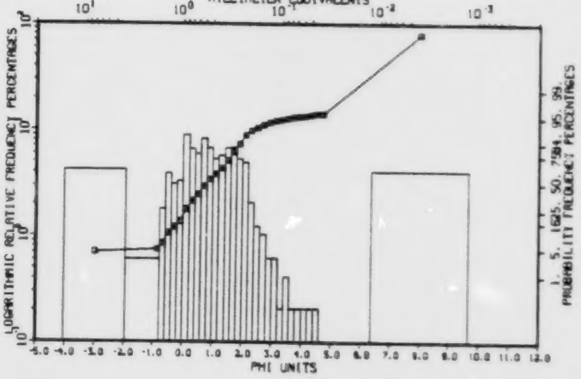
82031 IN-1 340-341 CM.
SAMPLE NUMBER 3022



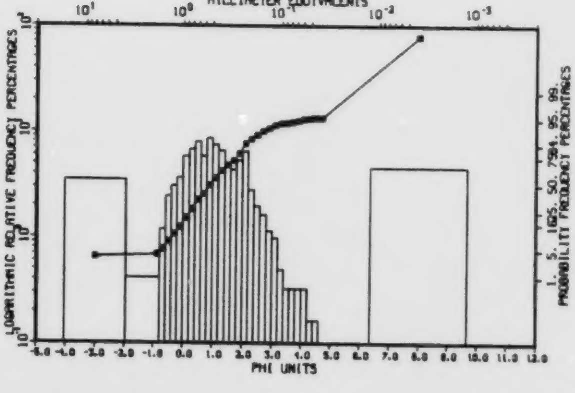
82031 IN-1 350-352 CM.
SAMPLE NUMBER 3023



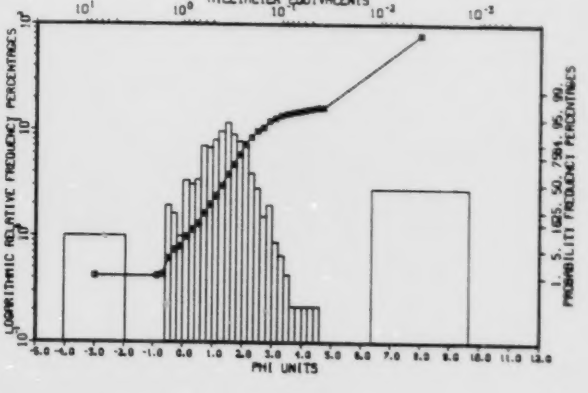
82031 IN-1 369-371 CM.
SAMPLE NUMBER 3024



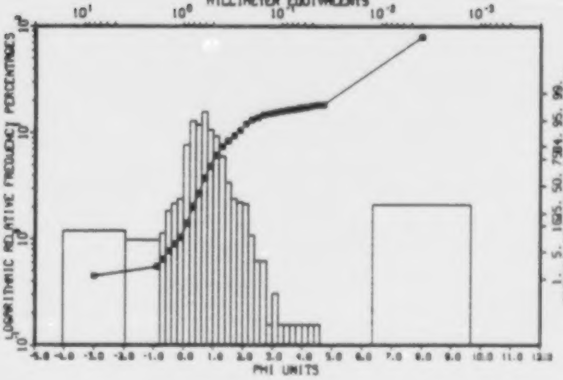
82031 IN-1 374-375 CM.
SAMPLE NUMBER 3025



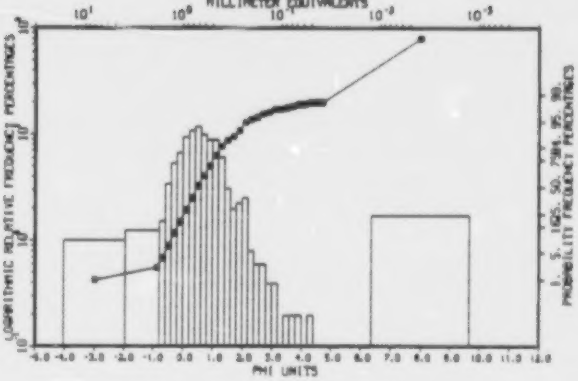
82031 IN-1 380-381 CM.
SAMPLE NUMBER 3026



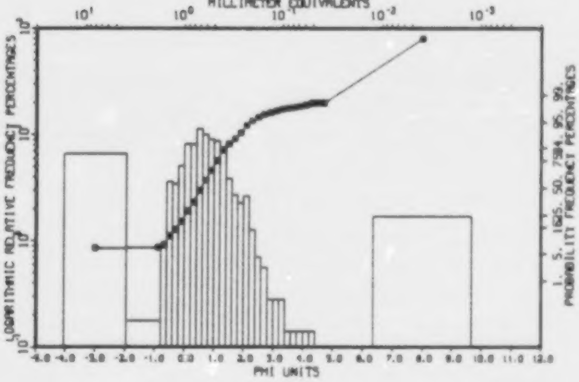
82031 IN-1 400-402 CM.
SAMPLE NUMBER 3027



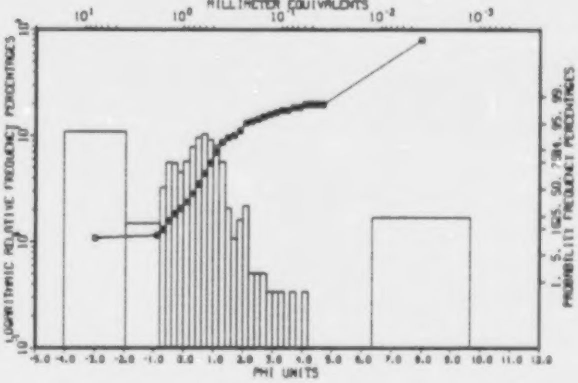
82031 IN-1 420-421 CM.
SAMPLE NUMBER 3028



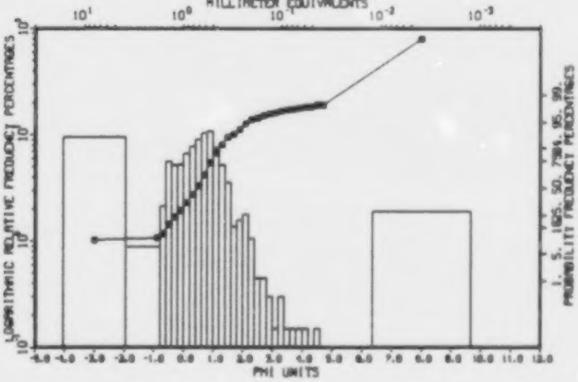
82031 IN-1 440-441 CM.
SAMPLE NUMBER 3029



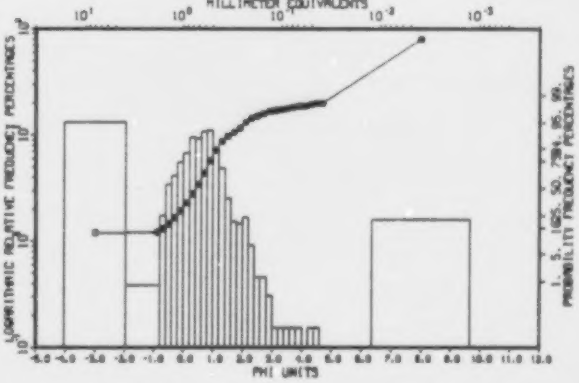
82031 IN-1 460-461 CM.
SAMPLE NUMBER 3030

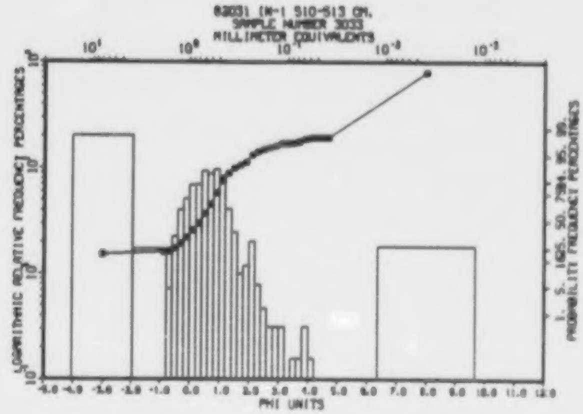


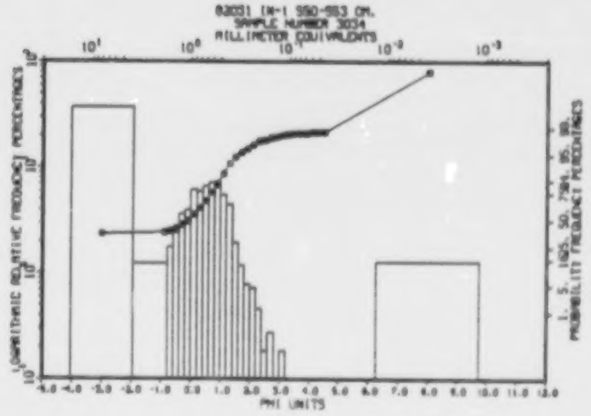
82031 IN-1 480-481 CM.
SAMPLE NUMBER 3031

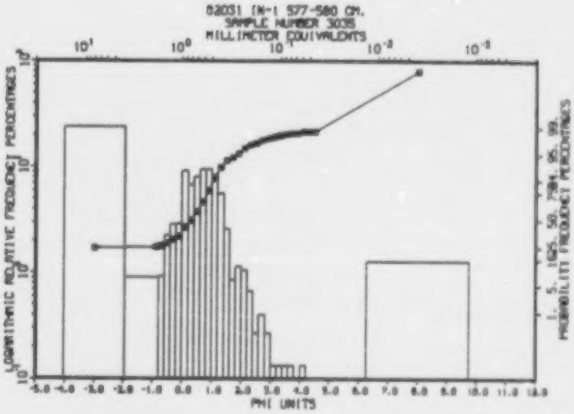


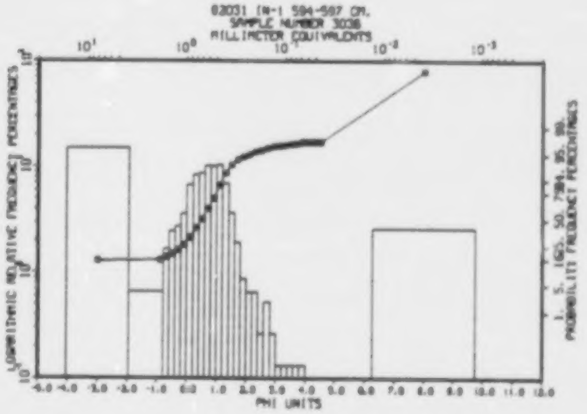
82031 IN-1 492-495 CM.
SAMPLE NUMBER 3032

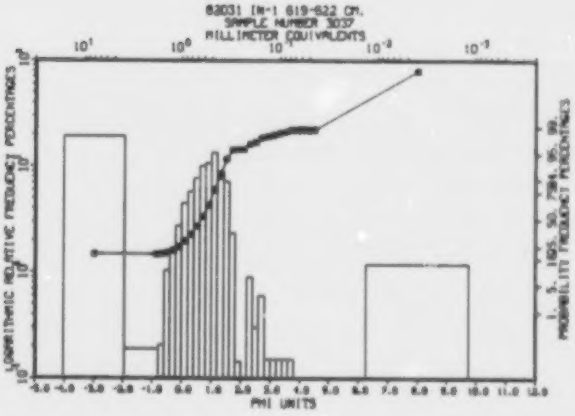


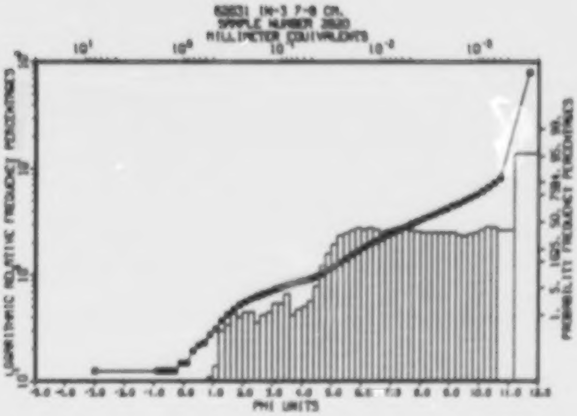

82031 (N-1 510-513 CM.
SAMPLE NUMBER 3033

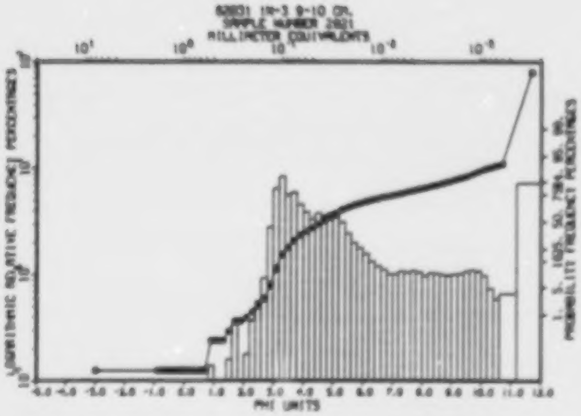

82031 (N-1 550-553 CM.
SAMPLE NUMBER 3034

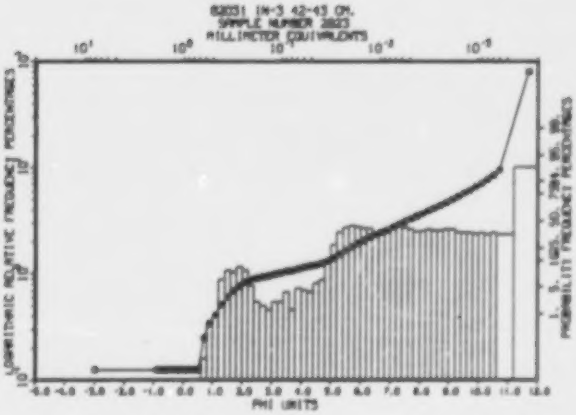

82031 (N-1 577-580 CM.
SAMPLE NUMBER 3035

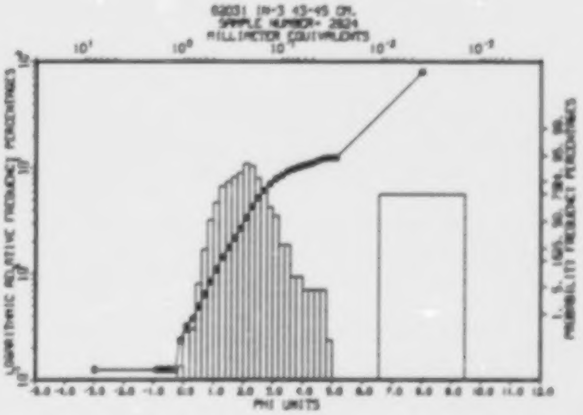

82031 (N-1 594-597 CM.
SAMPLE NUMBER 3036

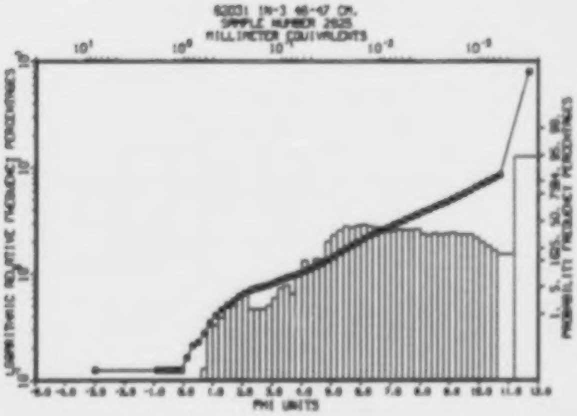

82031 (N-1 619-622 CM.
SAMPLE NUMBER 3037

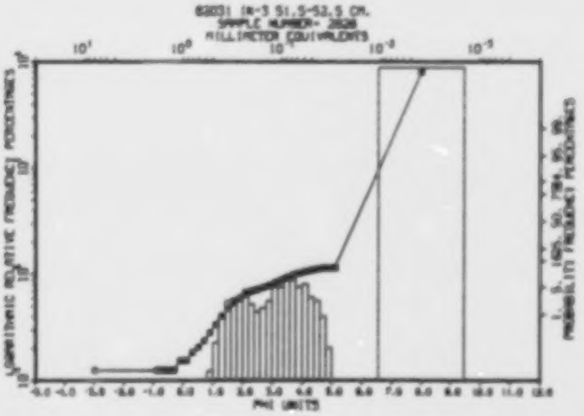

82031 IN-3 7-8 CM.
SAMPLE NUMBER 2820
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16 25. 50. 75 84. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

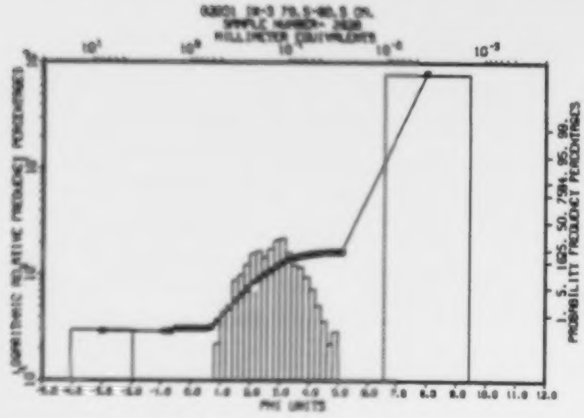

82031 IN-3 9-10 CM.
SAMPLE NUMBER 2821
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16 25. 50. 75 84. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

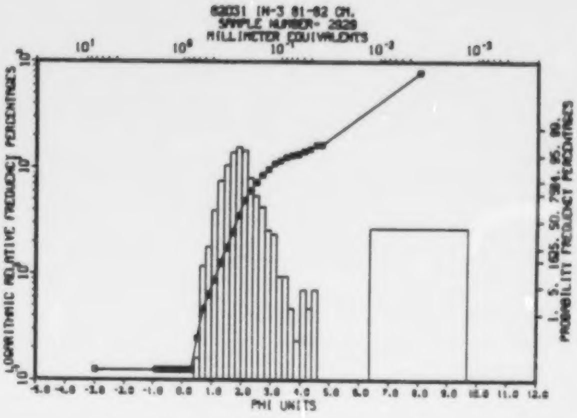

82031 IN-3 42-43 CM.
SAMPLE NUMBER 2823
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16 25. 50. 75 84. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

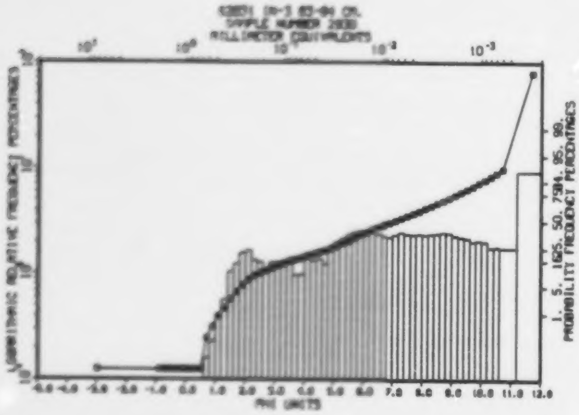

82031 IN-3 43-45 CM.
SAMPLE NUMBER= 2824
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16 25. 50. 75 84. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

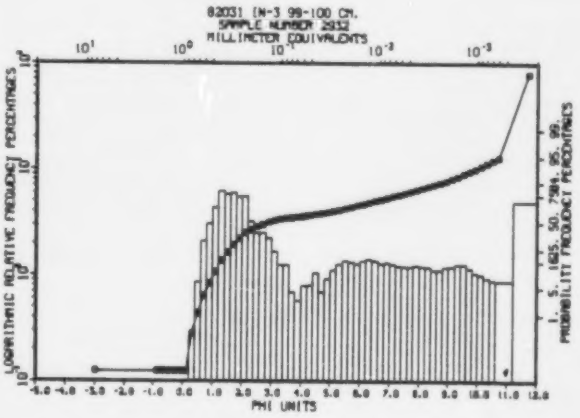

82031 IN-3 46-47 CM.
SAMPLE NUMBER 2825
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16 25. 50. 75 84. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

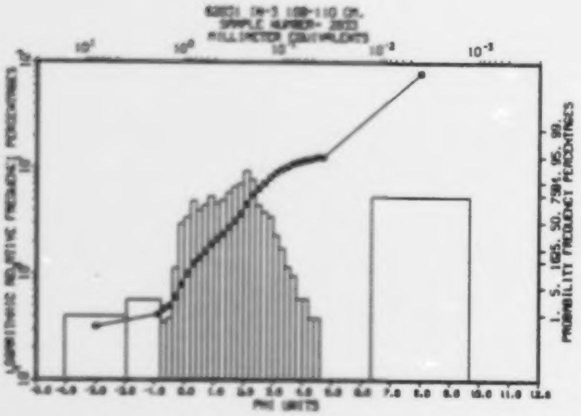

82031 IN-3 51.5-52.5 CM.
SAMPLE NUMBER= 2826
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16 25. 50. 75 84. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

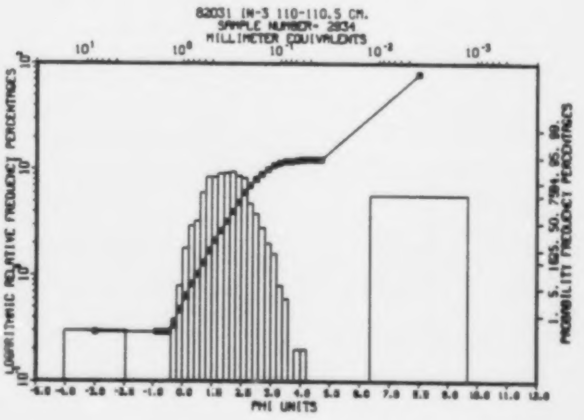

82031 IN-3 79.5-80.5 CM.
SAMPLE NUMBER- 2928
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


82031 IN-3 81-82 CM.
SAMPLE NUMBER- 2929
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

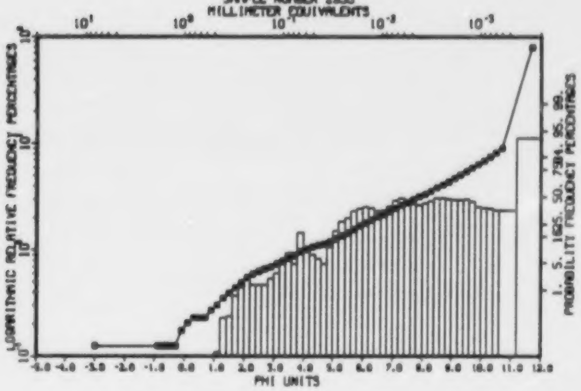

82031 IN-3 82-84 CM.
SAMPLE NUMBER 2930
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


82031 IN-3 99-100 CM.
SAMPLE NUMBER 2932
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

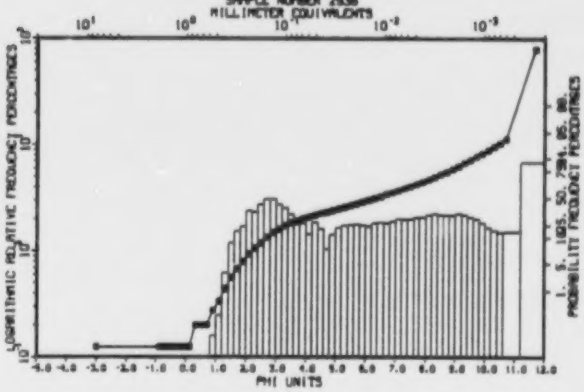

82031 IN-3 108-110 CM.
SAMPLE NUMBER- 2933
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


82031 IN-3 110-110.5 CM.
SAMPLE NUMBER- 2934
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

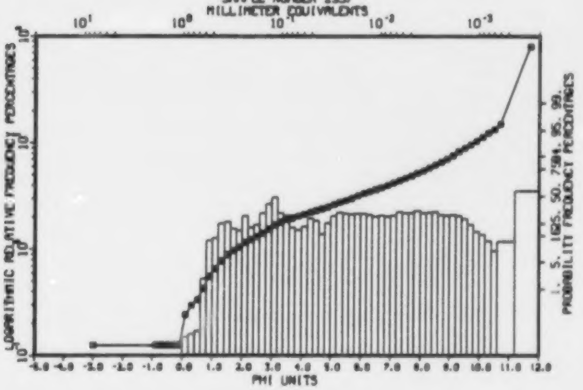
82031 IN-3 139-140 CM.
SAMPLE NUMBER 2935



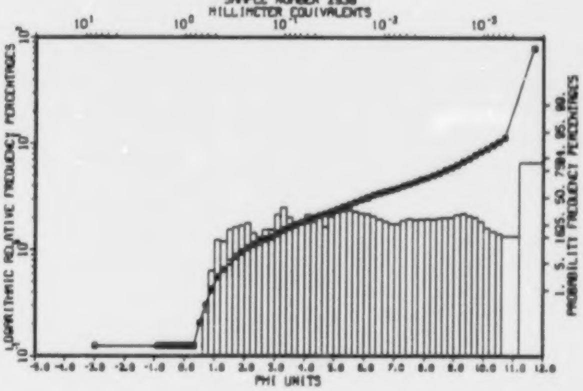
82031 IN-3 140-140.5 CM.
SAMPLE NUMBER 2936



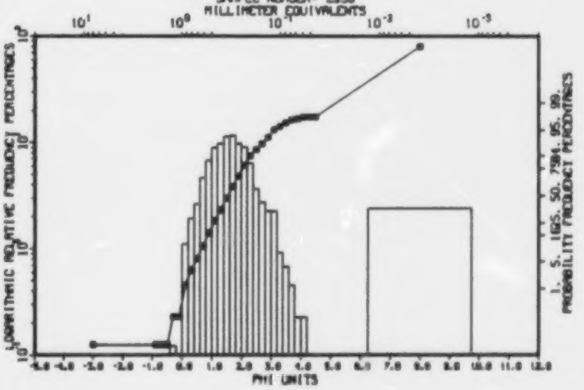
82031 IN-3 167-168 CM.
SAMPLE NUMBER 2937



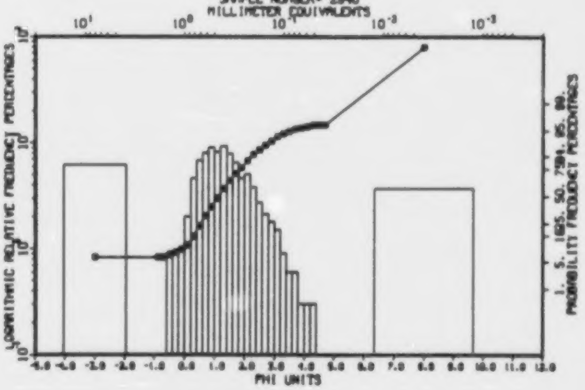
82031 IN-3 169-170 CM.
SAMPLE NUMBER 2938

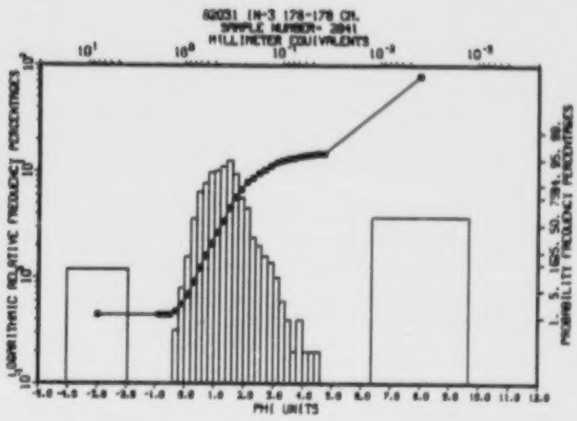


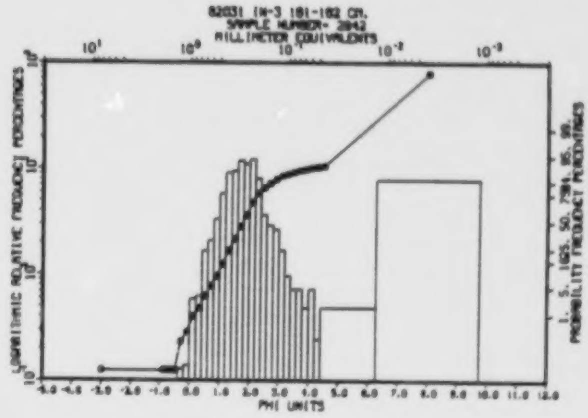
82031 IN-3 172-173 CM.
SAMPLE NUMBER- 2939

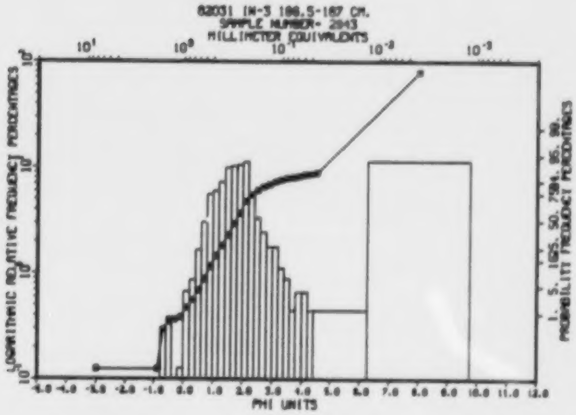


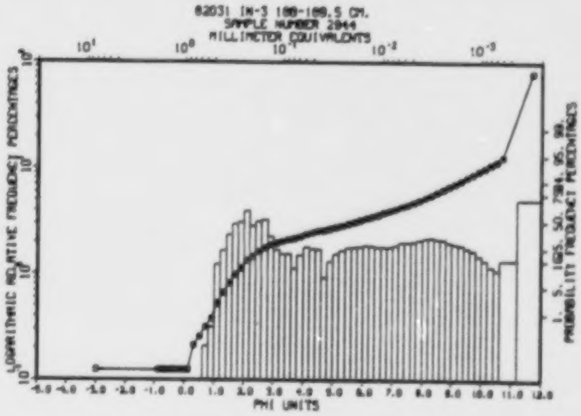
82031 IN-3 175-176 CM.
SAMPLE NUMBER- 2940

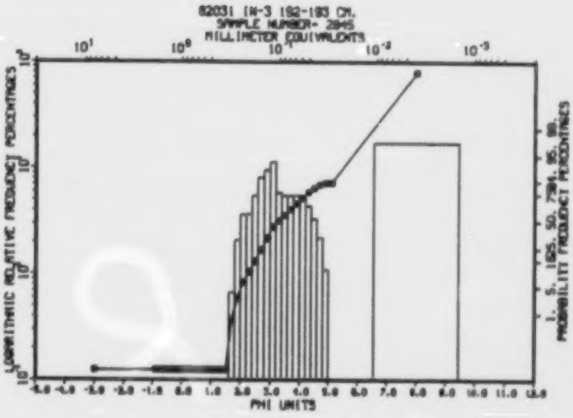


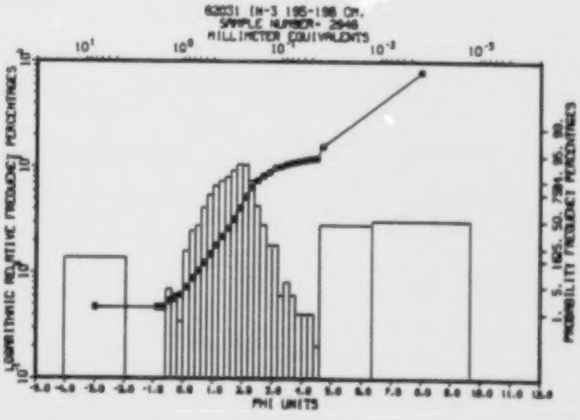

82031 IN-3 178-179 CM.
SAMPLE NUMBER- 2841
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

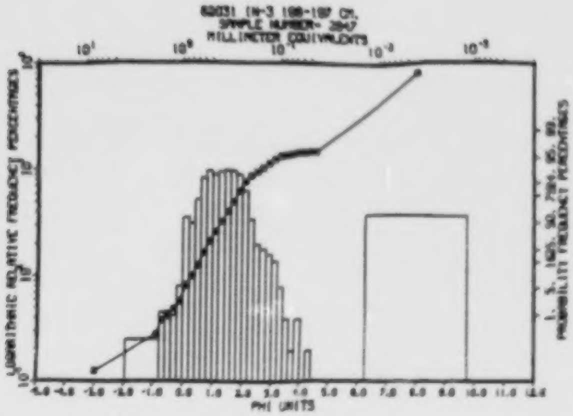

82031 IN-3 181-182 CM.
SAMPLE NUMBER- 2842
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

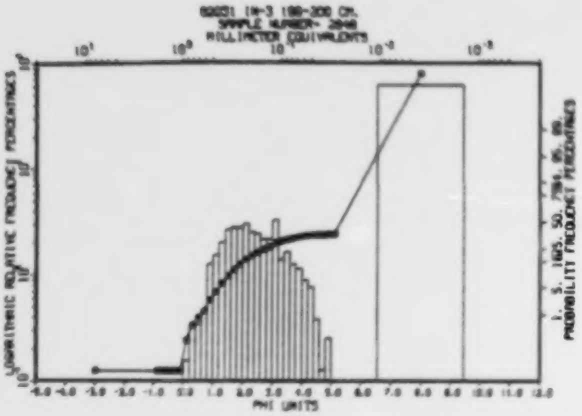

82031 IN-3 186.5-187 CM.
SAMPLE NUMBER- 2843
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

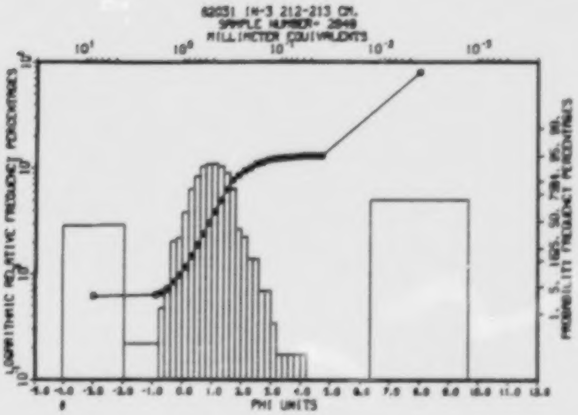

82031 IN-3 188-188.5 CM.
SAMPLE NUMBER 2844
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

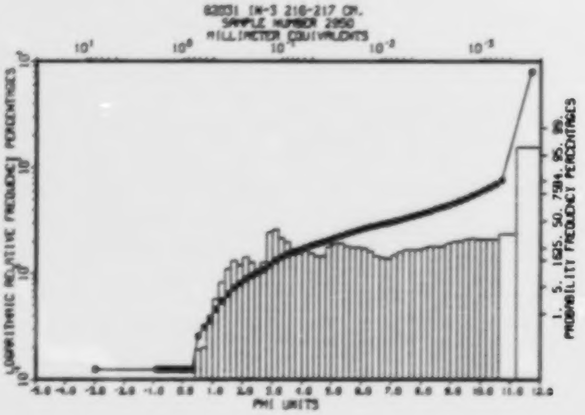

82031 IN-3 192-193 CM.
SAMPLE NUMBER- 2845
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

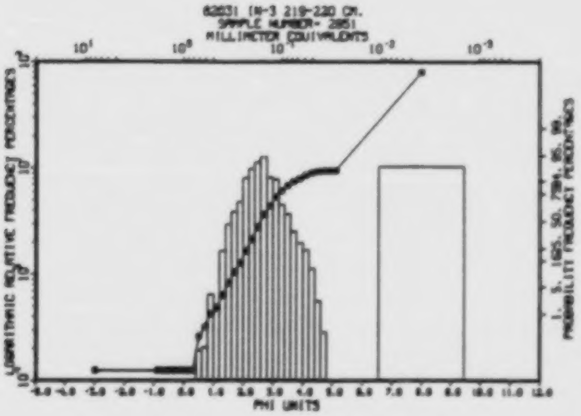

82031 IN-3 195-196 CM.
SAMPLE NUMBER- 2846
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

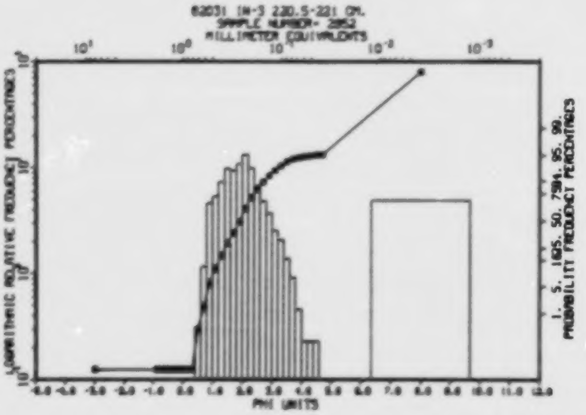

82031 IN-3 196-197 CM.
SAMPLE NUMBER- 2847
MILLIMETER EQUIVALENTS

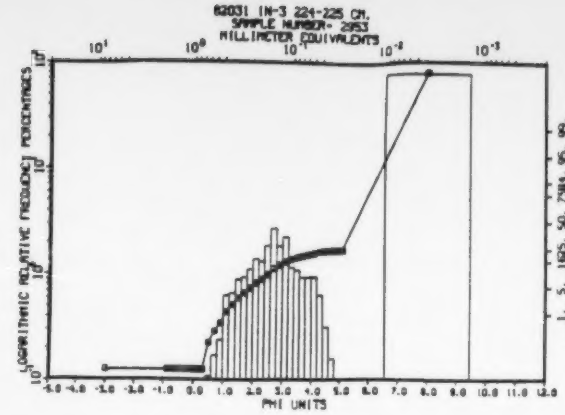

82031 IN-3 199-200 CM.
SAMPLE NUMBER- 2848
MILLIMETER EQUIVALENTS

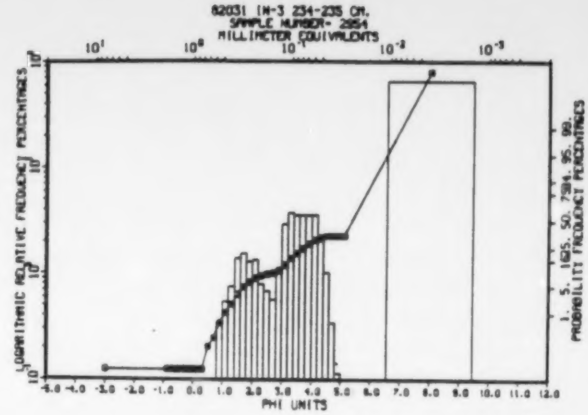

82031 IN-3 212-213 CM.
SAMPLE NUMBER- 2849
MILLIMETER EQUIVALENTS

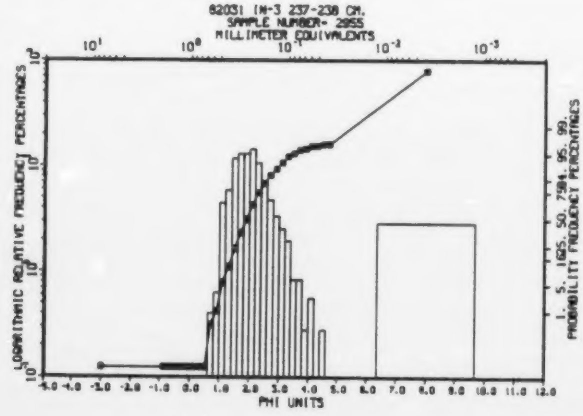

82031 IN-3 216-217 CM.
SAMPLE NUMBER 2850
MILLIMETER EQUIVALENTS

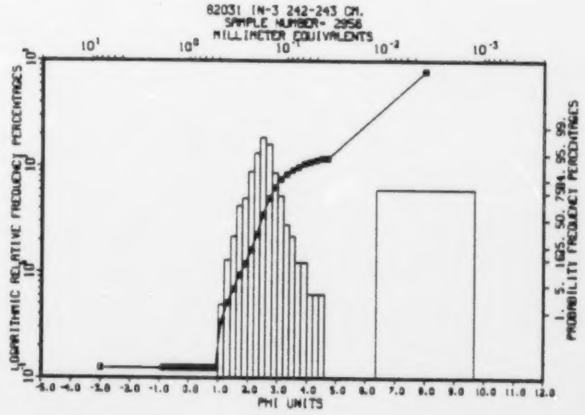

82031 IN-3 219-220 CM.
SAMPLE NUMBER- 2851
MILLIMETER EQUIVALENTS

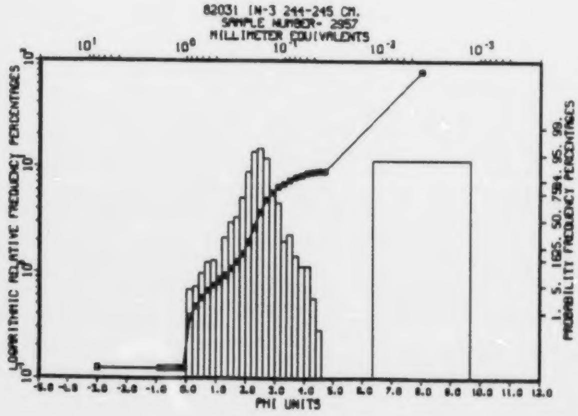

82031 IN-3 220.5-221 CM.
SAMPLE NUMBER- 2852
MILLIMETER EQUIVALENTS

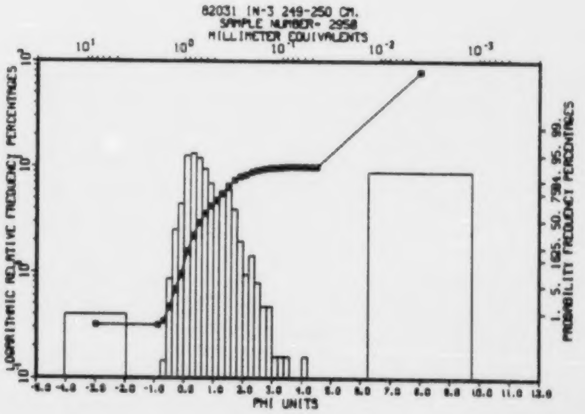

82031 IN-3 224-225 CM.
SAMPLE NUMBER- 2953
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS


82031 IN-3 234-235 CM.
SAMPLE NUMBER- 2954
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

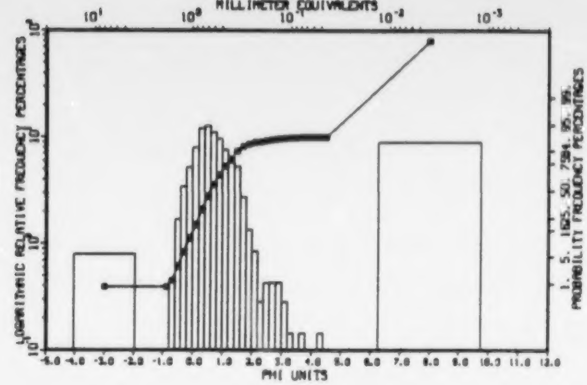

82031 IN-3 237-238 CM.
SAMPLE NUMBER- 2955
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS


82031 IN-3 242-243 CM.
SAMPLE NUMBER- 2956
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

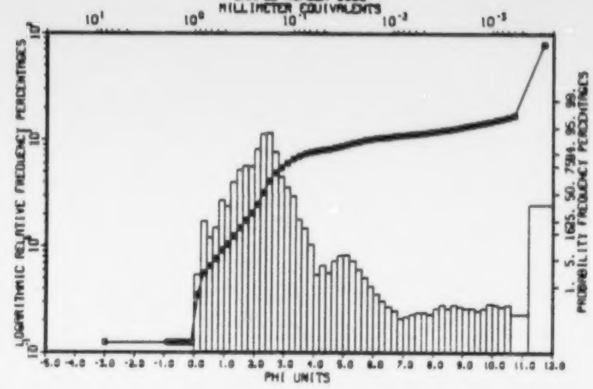

82031 IN-3 244-245 CM.
SAMPLE NUMBER- 2957
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS


82031 IN-3 249-250 CM.
SAMPLE NUMBER- 2958
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

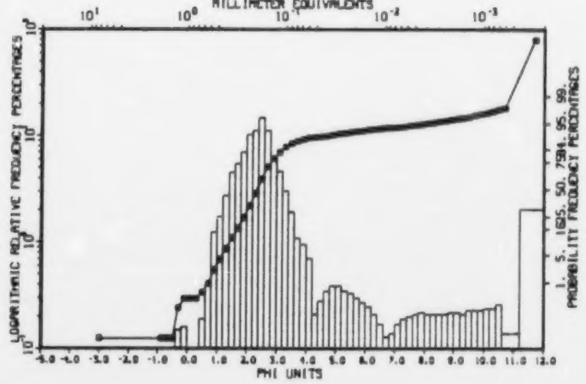
82031 IN-3 258-260 CM.
SAMPLE NUMBER- 2959
MILLIMETER EQUIVALENTS



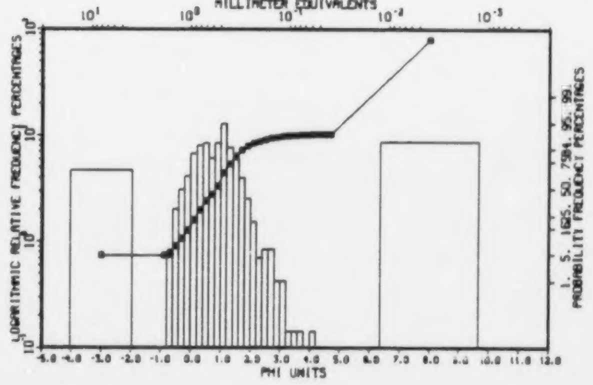
82031 IN-3 262-262.5 CM.
SAMPLE NUMBER 2960
MILLIMETER EQUIVALENTS



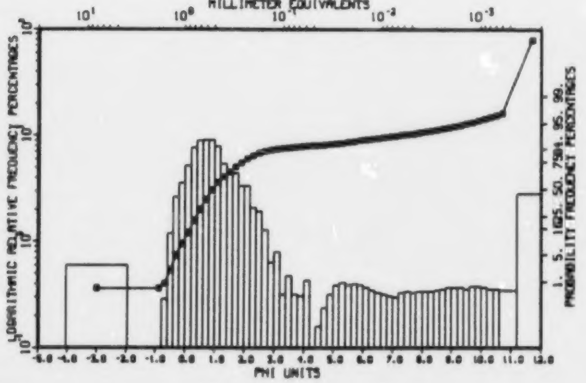
82031 IN-3 262.5-263 CM.
SAMPLE NUMBER 2961
MILLIMETER EQUIVALENTS



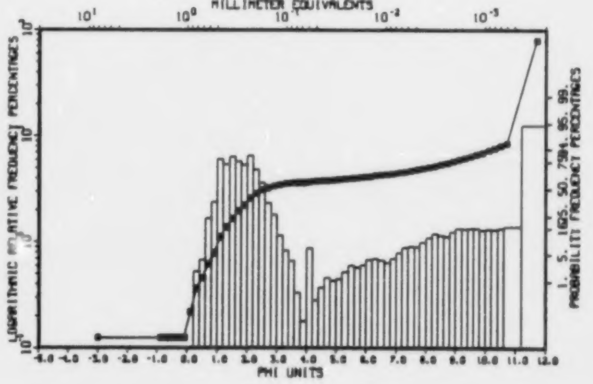
82031 IN-3 265-266 CM.
SAMPLE NUMBER- 2962
MILLIMETER EQUIVALENTS



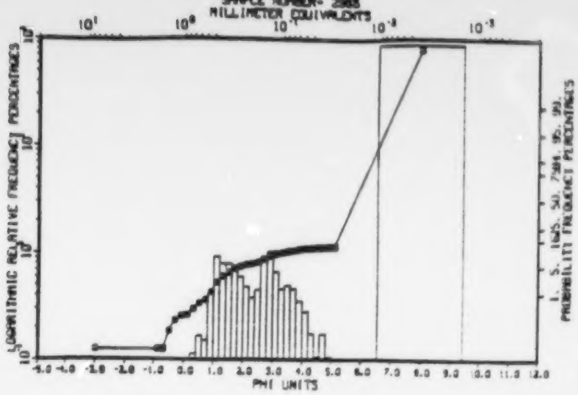
82031 IN-3 268-269 CM.
SAMPLE NUMBER 2963
MILLIMETER EQUIVALENTS



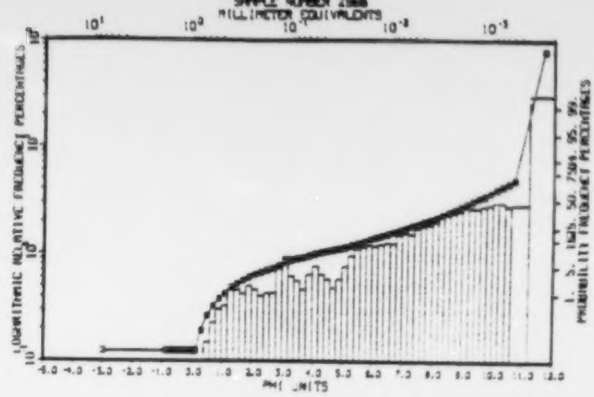
82031 IN-3 269-270 CM.
SAMPLE NUMBER 2964
MILLIMETER EQUIVALENTS



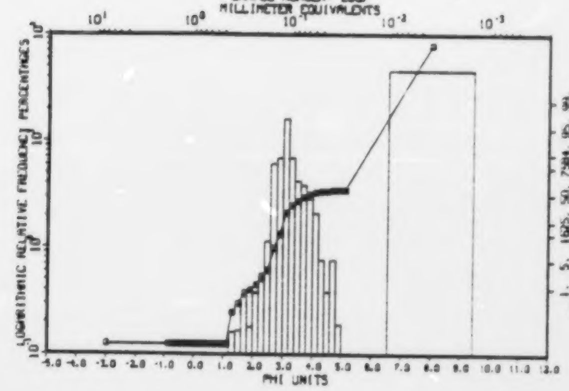
82031 IN-3 278-279 CM.
SAMPLE NUMBER- 2965



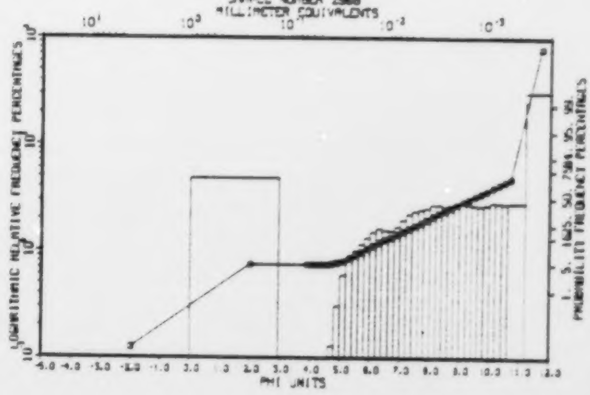
82031 IN-3 300-301 CM.
SAMPLE NUMBER 2966



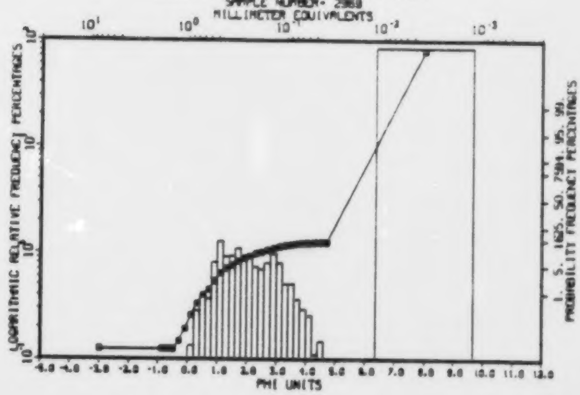
82031 IN-3 320-321 CM.
SAMPLE NUMBER- 2967



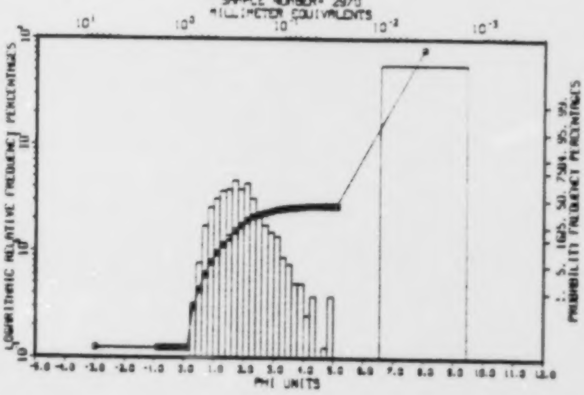
82031 IN-3 324-325 CM.
SAMPLE NUMBER 2968

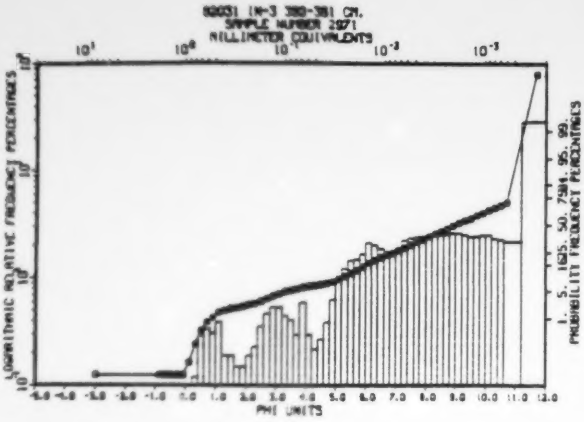


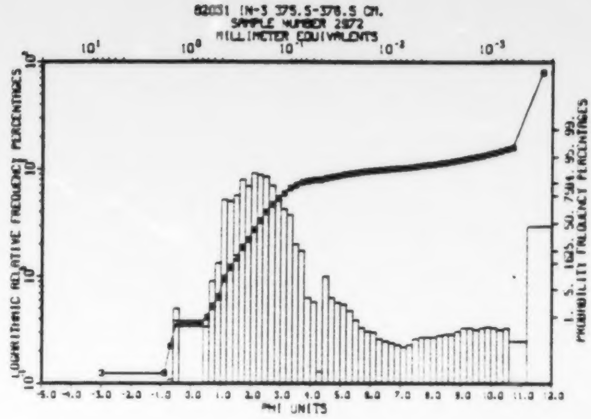
82031 IN-3 349-350 CM. J. SYVITSKI
SAMPLE NUMBER- 2969

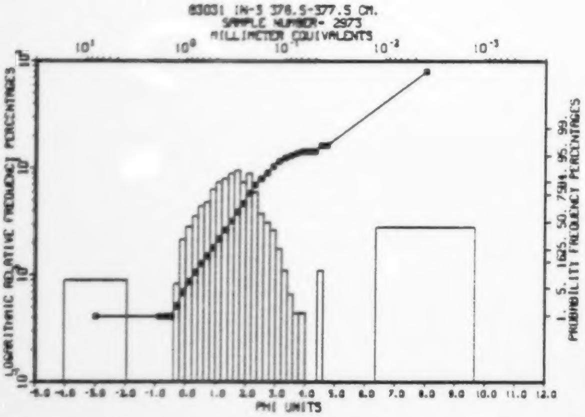


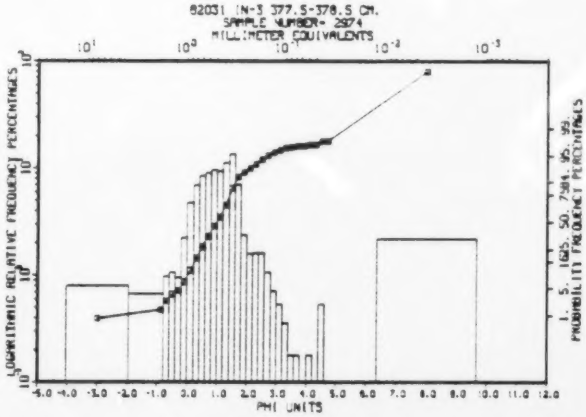
82031 IN-3 352-353 CM.
SAMPLE NUMBER- 2970

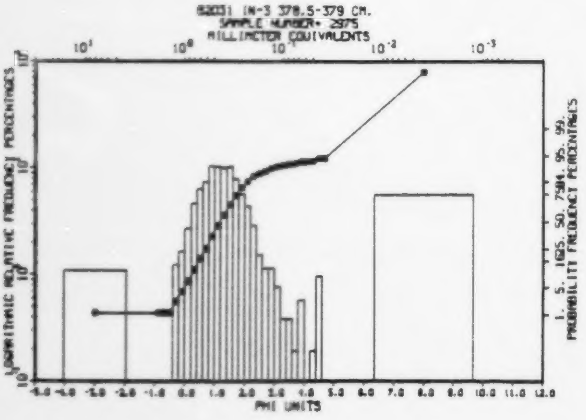


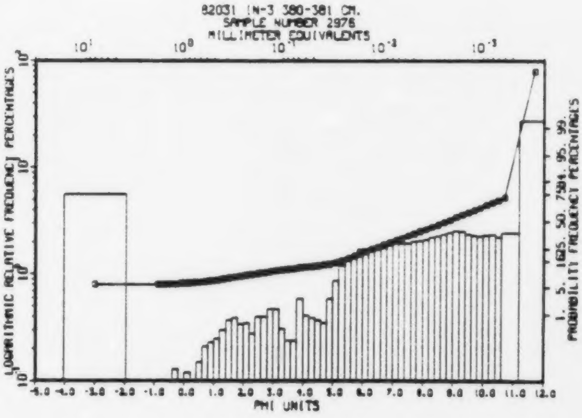

82031 IN-3 380-381 CM.
SAMPLE NUMBER 2971

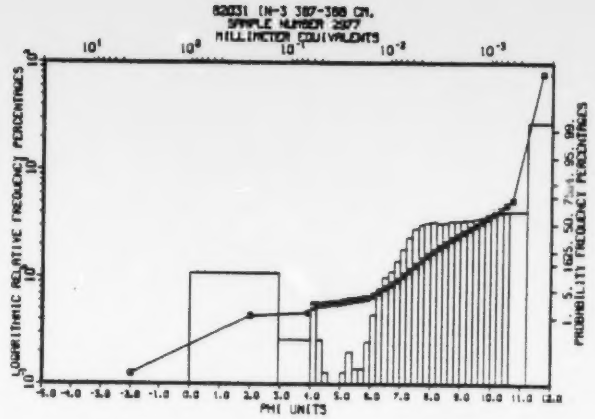

82031 IN-3 375.5-376.5 CM.
SAMPLE NUMBER 2972

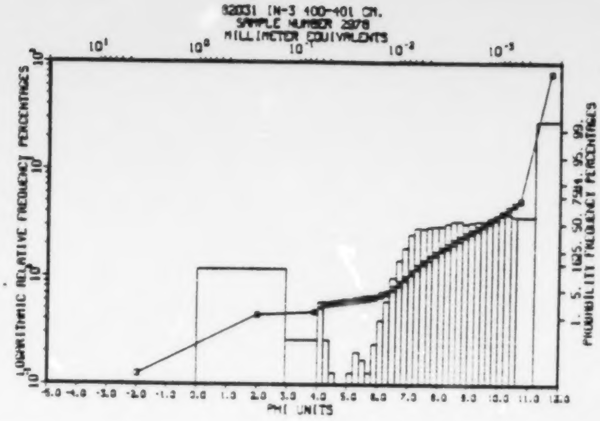

83031 IN-3 376.5-377.5 CM.
SAMPLE NUMBER- 2973

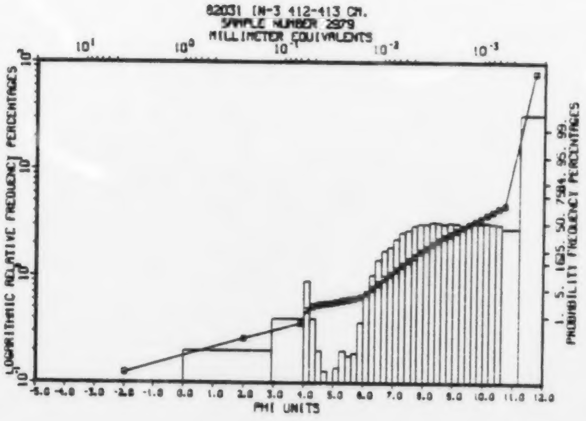

82031 IN-3 377.5-378.5 CM.
SAMPLE NUMBER- 2974

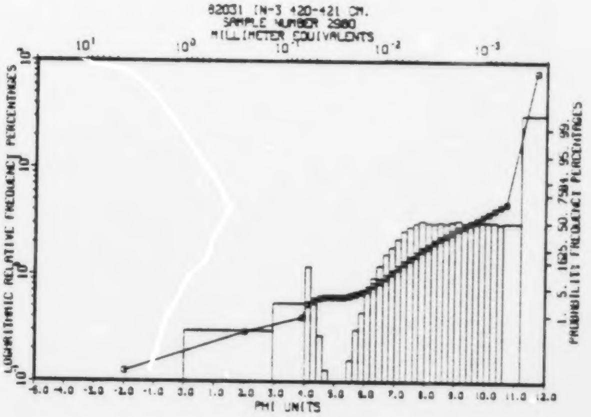

82031 IN-3 378.5-379 CM.
SAMPLE NUMBER- 2975

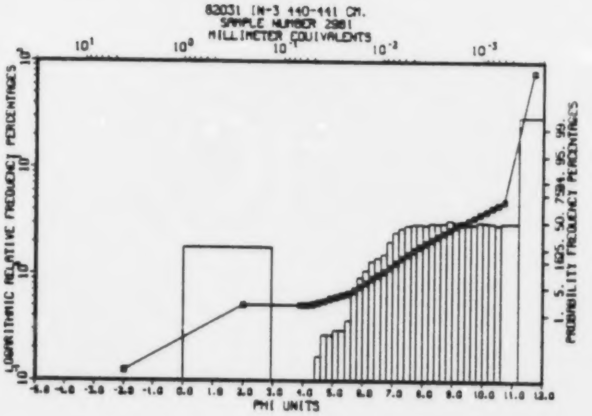

82031 IN-3 380-381 CM.
SAMPLE NUMBER 2976

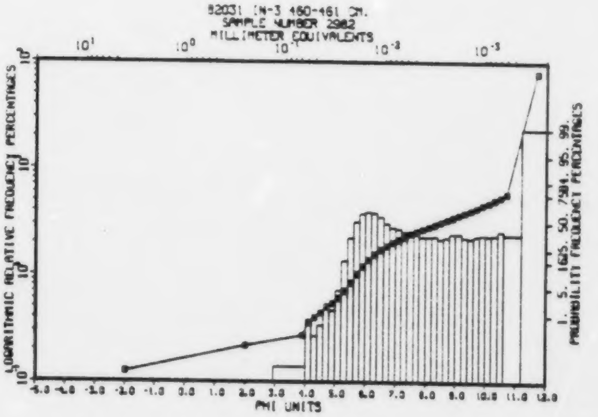

82031 IN-3 387-388 CM.
SAMPLE NUMBER 2977

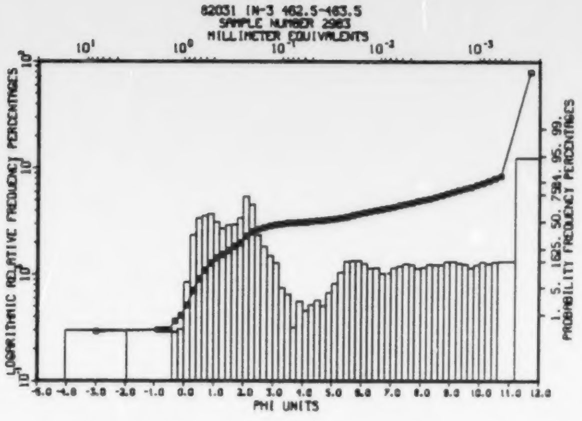

82031 IN-3 400-401 CM.
SAMPLE NUMBER 2978

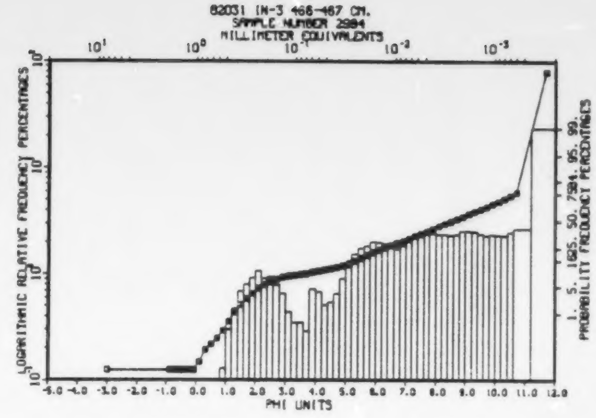

82031 IN-3 412-413 CM.
SAMPLE NUMBER 2979

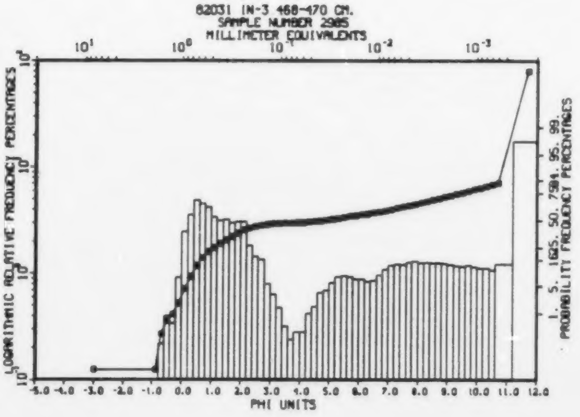

82031 IN-3 420-421 CM.
SAMPLE NUMBER 2980

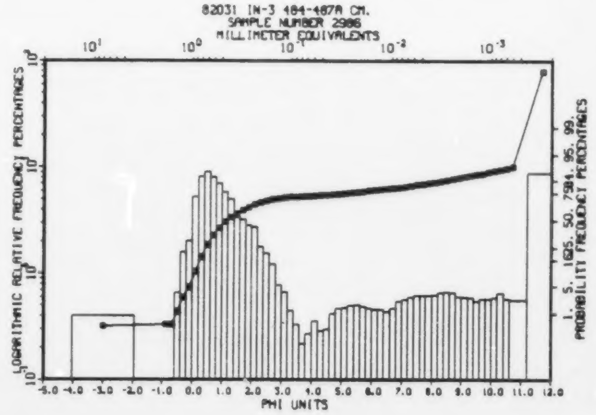

82031 IN-3 440-441 CM.
SAMPLE NUMBER 2981

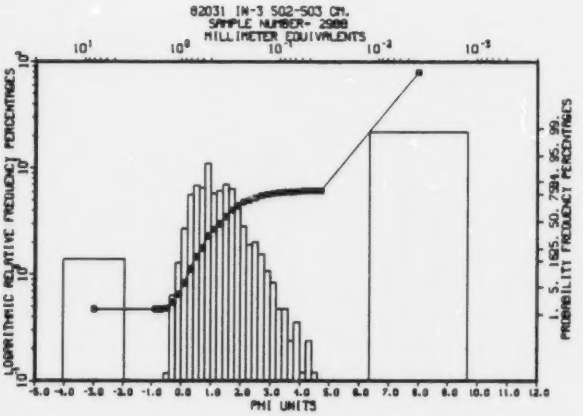

82031 IN-3 460-461 CM.
SAMPLE NUMBER 2982

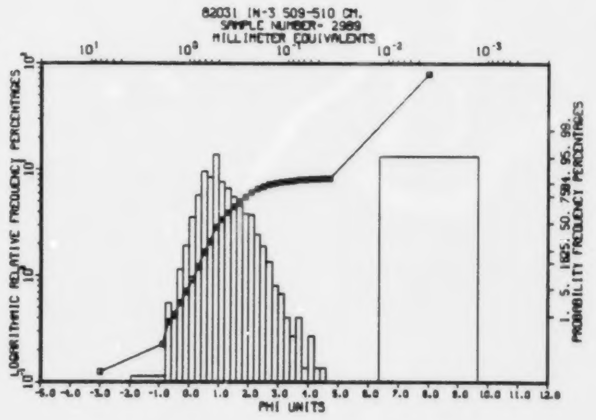

82031 IN-3 462.5-463.5
SAMPLE NUMBER 2983
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2 10^1 10^0 10^{-1}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

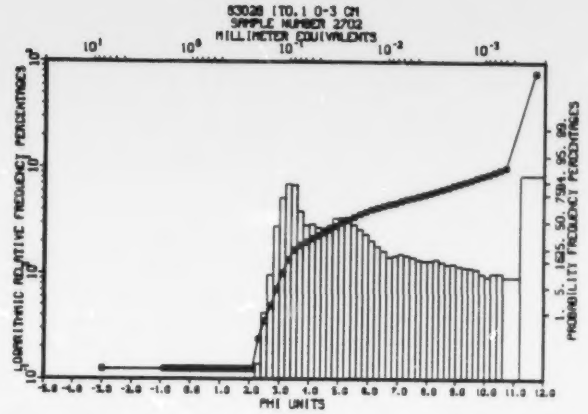

82031 IN-3 466-467 CM.
SAMPLE NUMBER 2984
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2 10^1 10^0 10^{-1}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

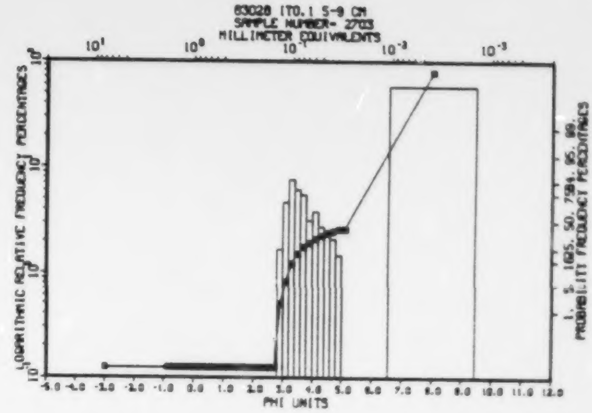

82031 IN-3 468-470 CM.
SAMPLE NUMBER 2985
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2 10^1 10^0 10^{-1}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

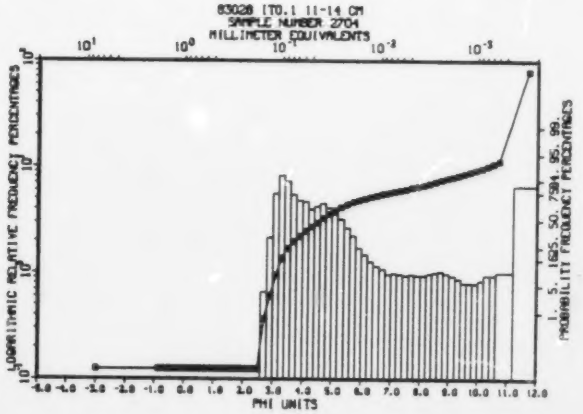

82031 IN-3 484-487A CM.
SAMPLE NUMBER 2986
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2 10^1 10^0 10^{-1}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

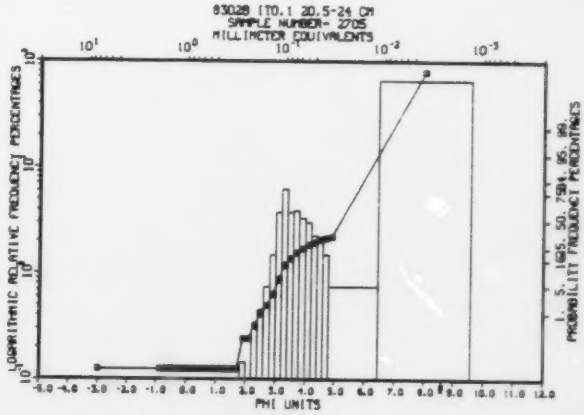

82031 IN-3 502-503 CM.
SAMPLE NUMBER- 2988
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2 10^1 10^0 10^{-1}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

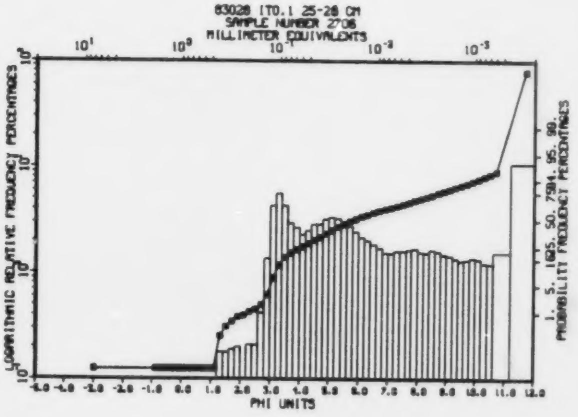

82031 IN-3 509-510 CM.
SAMPLE NUMBER- 2989
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2 10^1 10^0 10^{-1}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

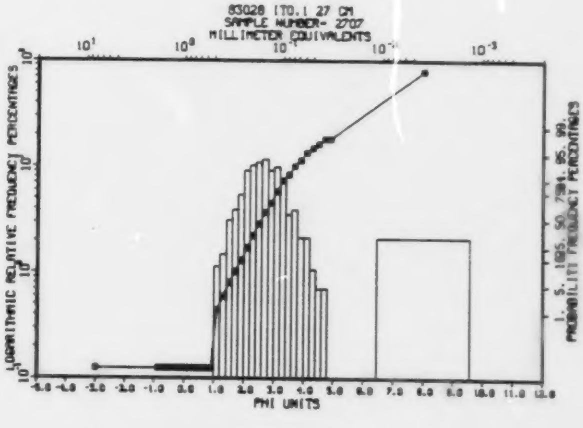

83028 ITO.1 0-3 CM
SAMPLE NUMBER 2702

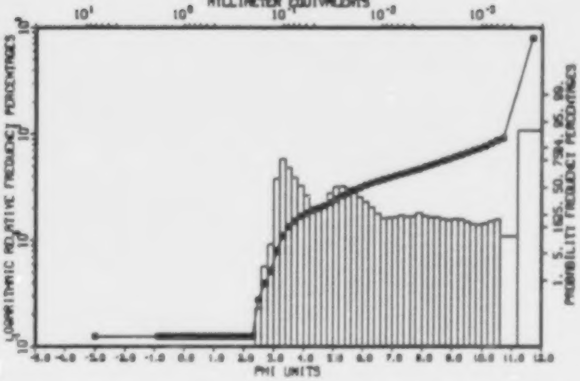

83028 ITO.1 5-9 CM
SAMPLE NUMBER- 2703


83028 ITO.1 11-14 CM
SAMPLE NUMBER 2704

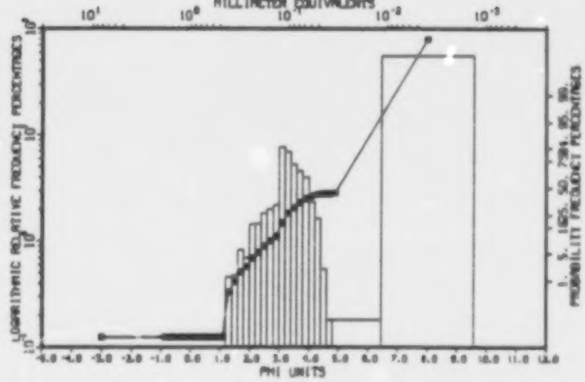

83028 ITO.1 20.5-24 CM
SAMPLE NUMBER- 2705


83028 ITO.1 25-28 CM
SAMPLE NUMBER 2706

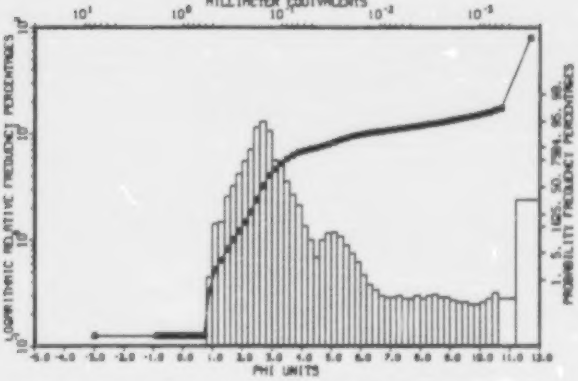

83028 ITO.1 27 CM
SAMPLE NUMBER- 2707



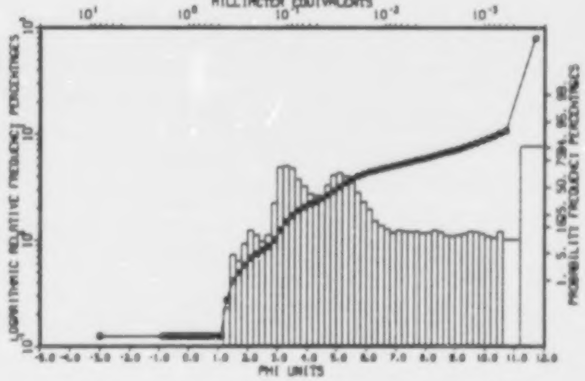
83028 ITO.1 35-38 CM
SAMPLE NUMBER 2708



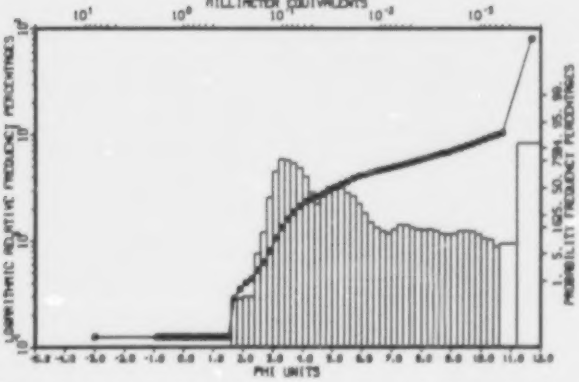
83028 ITO.1 45-46 CM
SAMPLE NUMBER= 2709



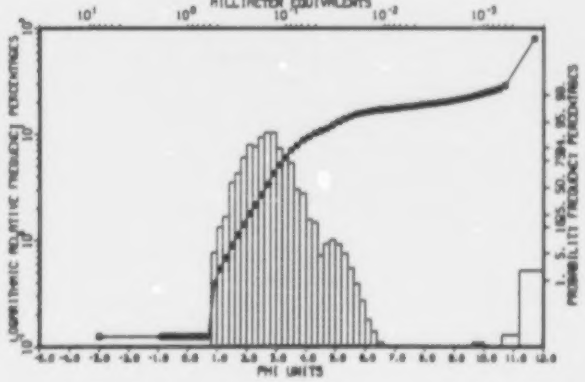
83028 ITO.1 46-48 CM
SAMPLE NUMBER 2710



83028 ITO.1 48-48.5 CM
SAMPLE NUMBER 2711

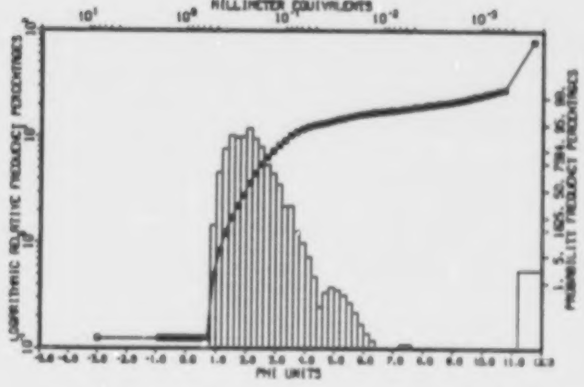


83028 ITO.1 50-50.5 CM
SAMPLE NUMBER 2712

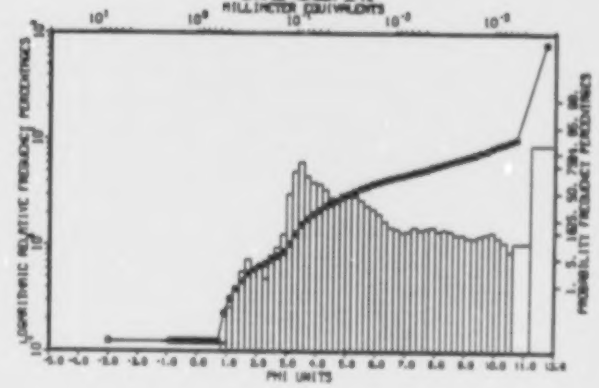


83028 ITO.1 50.5-51 CM
SAMPLE NUMBER 2713

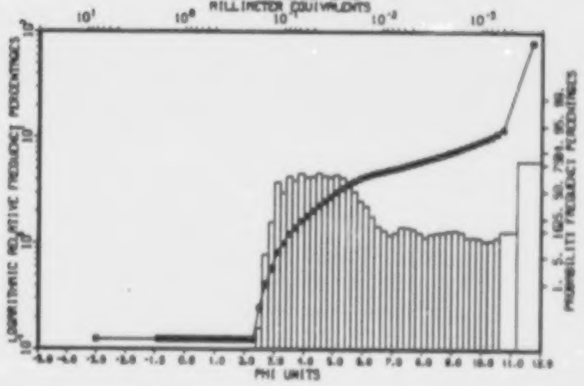
83028 ITO.1 51-53 CM
SAMPLE NUMBER 2714



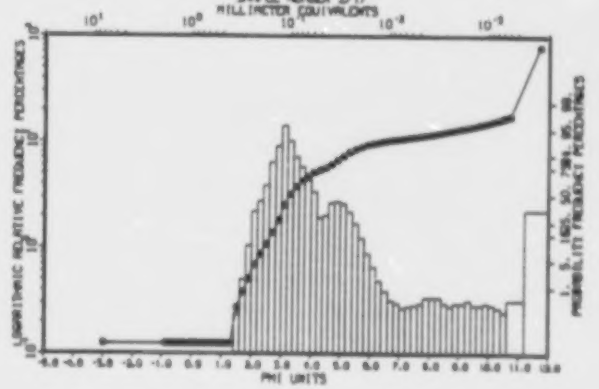
83028 ITO.1 52-53 CM
SAMPLE NUMBER 2715



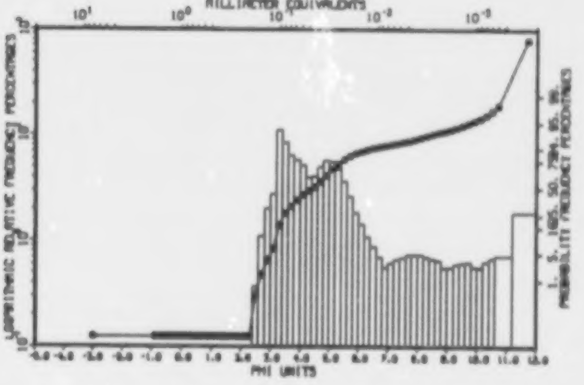
83028 ITO.1 53.5-55 CM
SAMPLE NUMBER 2716



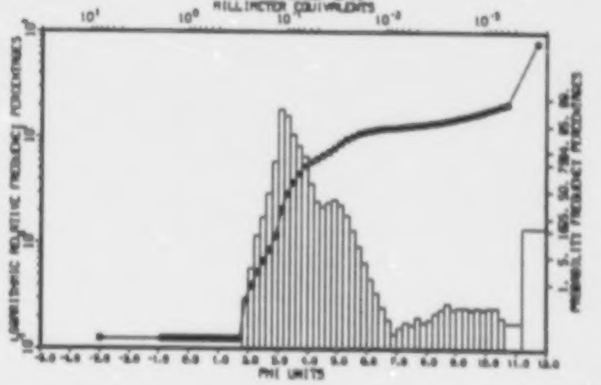
83028 ITO.1 55-55.5 CM
SAMPLE NUMBER 2717

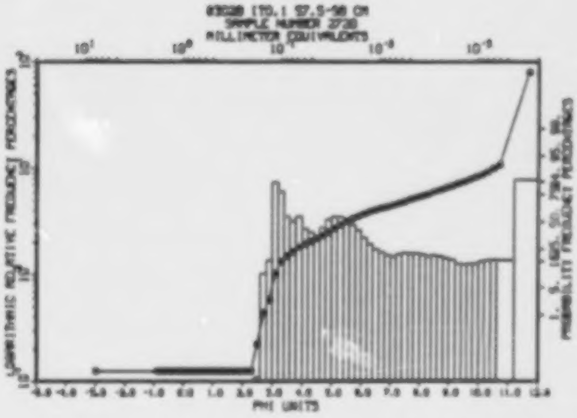


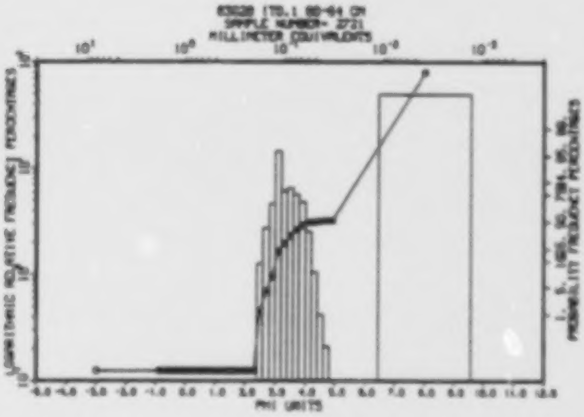
83028 ITO.1 55.5-56.5 CM
SAMPLE NUMBER 2718

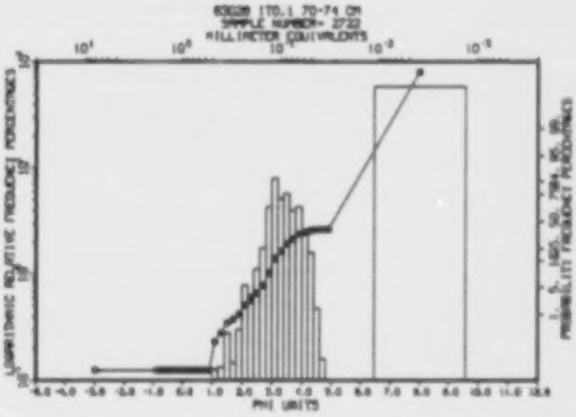


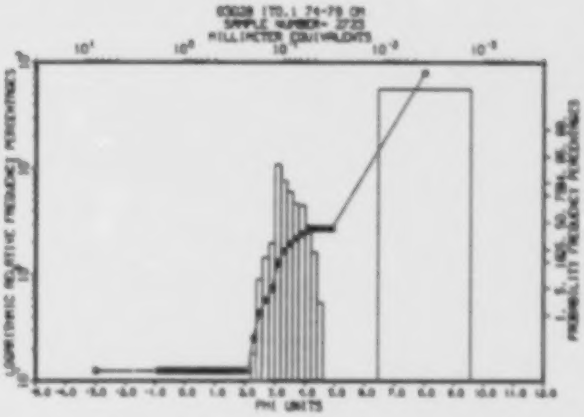
83028 ITO.1 56.5-57.5 CM
SAMPLE NUMBER 2719

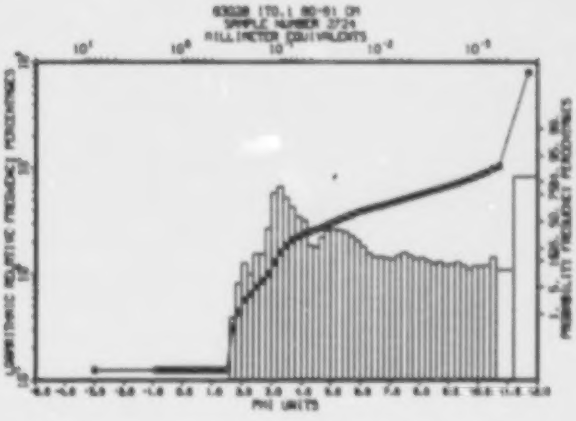


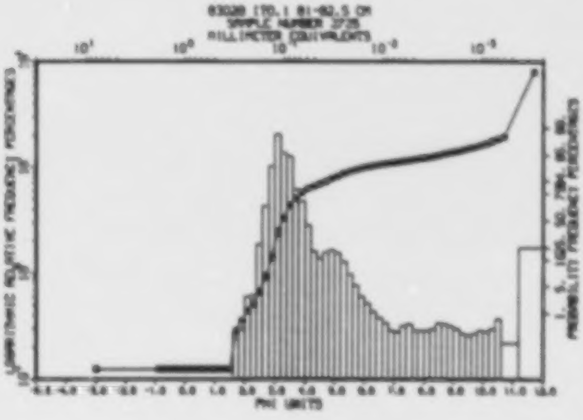

83028 ITD.1 57.5-58 CM
SAMPLE NUMBER 2720
MILLIMETER EQUIVALENTS

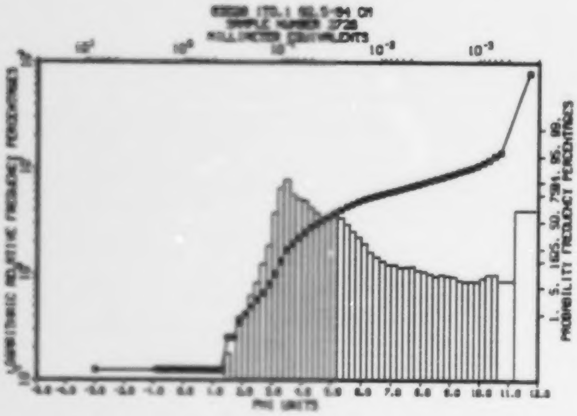

83028 ITD.1 60-64 CM
SAMPLE NUMBER= 2721
MILLIMETER EQUIVALENTS

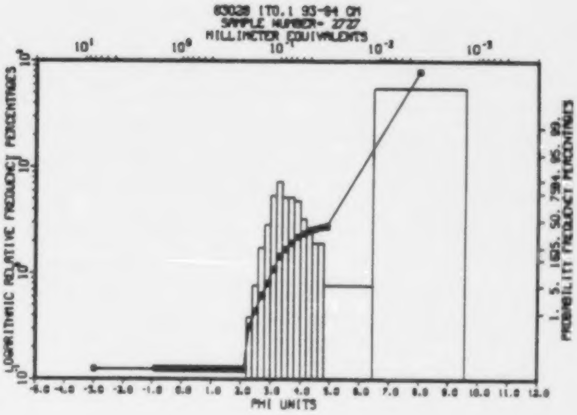

83028 ITD.1 70-74 CM
SAMPLE NUMBER= 2722
MILLIMETER EQUIVALENTS

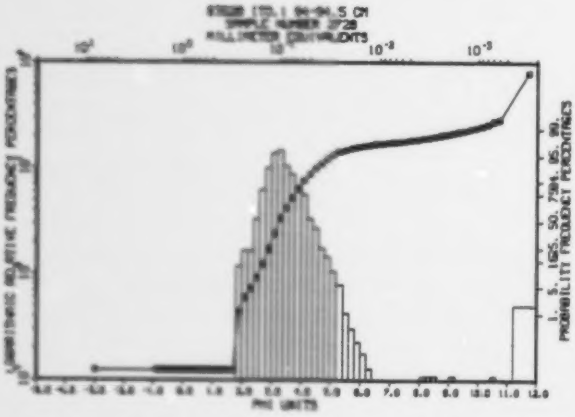

83028 ITD.1 74-78 CM
SAMPLE NUMBER= 2723
MILLIMETER EQUIVALENTS

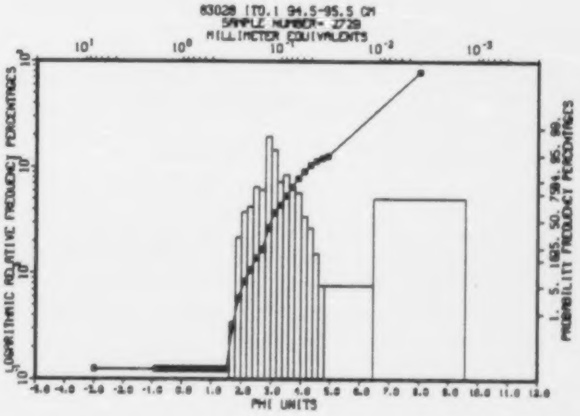

83028 ITD.1 80-81 CM
SAMPLE NUMBER 2724
MILLIMETER EQUIVALENTS

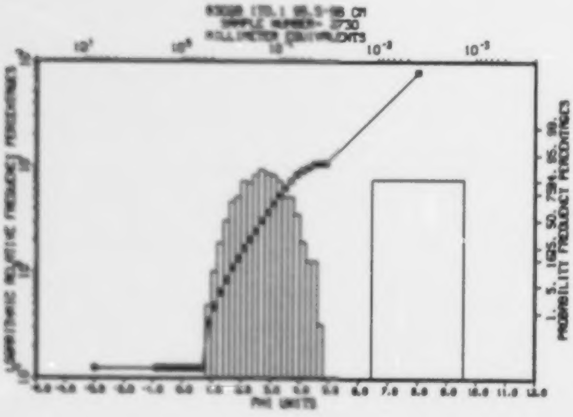

83028 ITD.1 81-82.5 CM
SAMPLE NUMBER 2725
MILLIMETER EQUIVALENTS

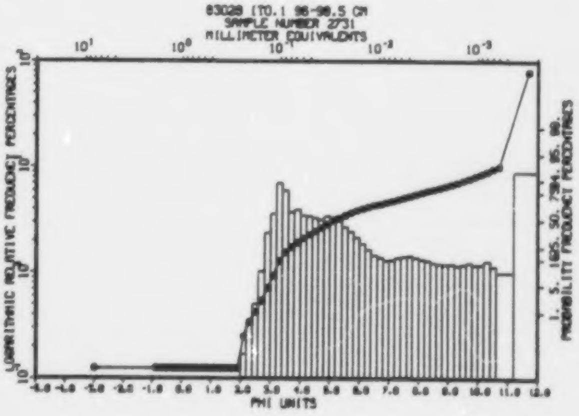

83028 ITO.1 92.5-93 CM
SAMPLE NUMBER 2726
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
PHI UNITS


83028 ITO.1 93-94 CM
SAMPLE NUMBER- 2727
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

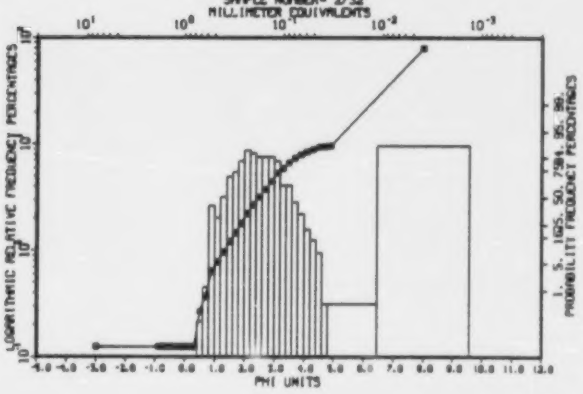

83028 ITO.1 94-94.5 CM
SAMPLE NUMBER 2728
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
PHI UNITS


83028 ITO.1 94.5-95.5 CM
SAMPLE NUMBER- 2729
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

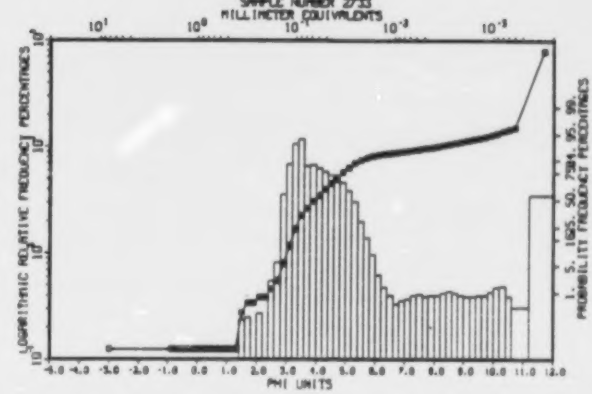

83028 ITO.1 95.5-96 CM
SAMPLE NUMBER- 2730
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
PHI UNITS


83028 ITO.1 96-96.5 CM
SAMPLE NUMBER 2731
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

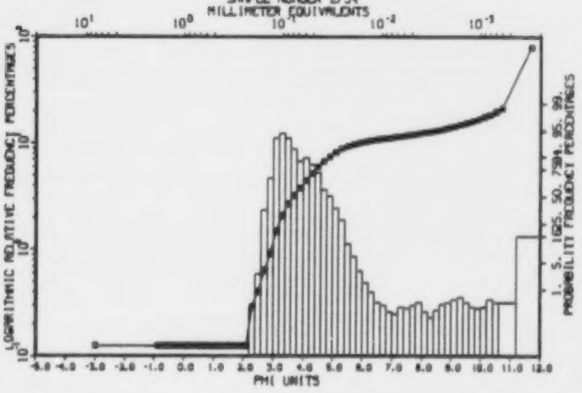
83028 ITO.1 98.5-100 CM
SAMPLE NUMBER- 2732



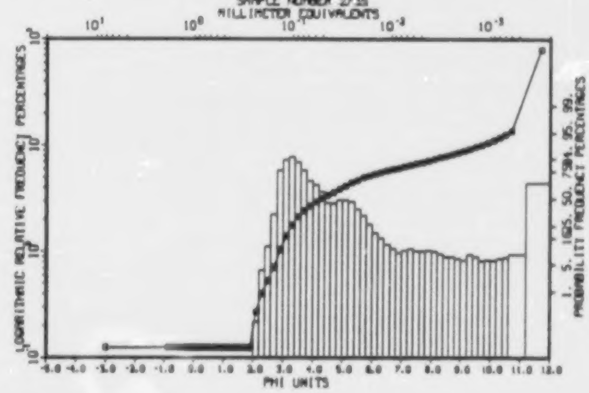
83028 ITO.1 100-101 CM
SAMPLE NUMBER 2733



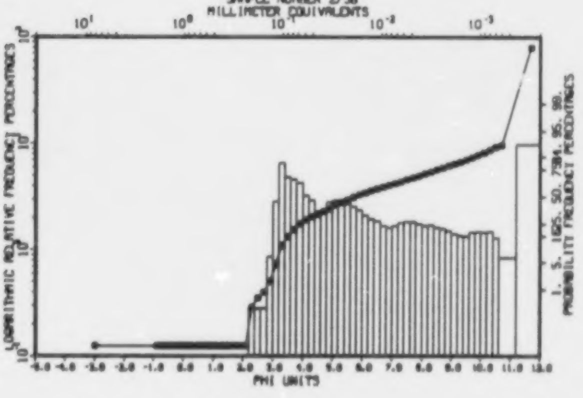
83028 ITO.1 101-102 CM
SAMPLE NUMBER 2734



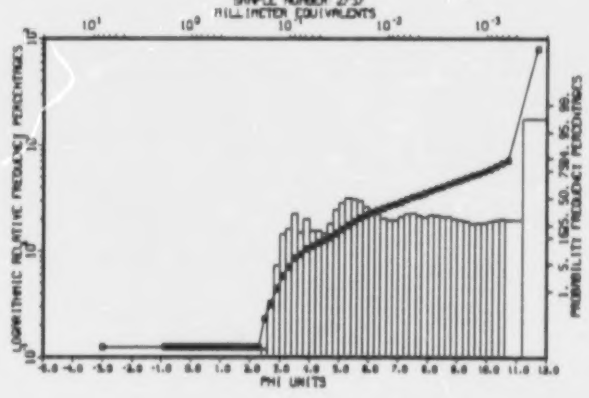
83028 ITO.1 102-103 CM
SAMPLE NUMBER 2735

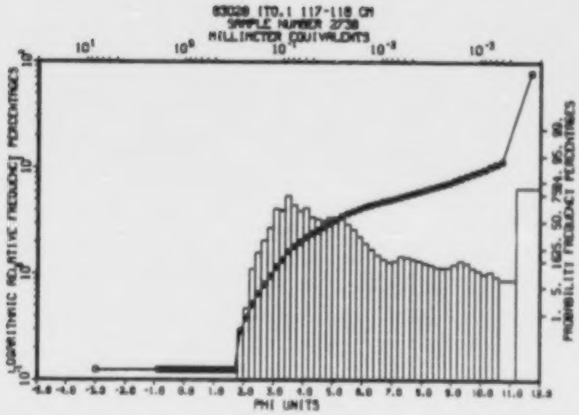


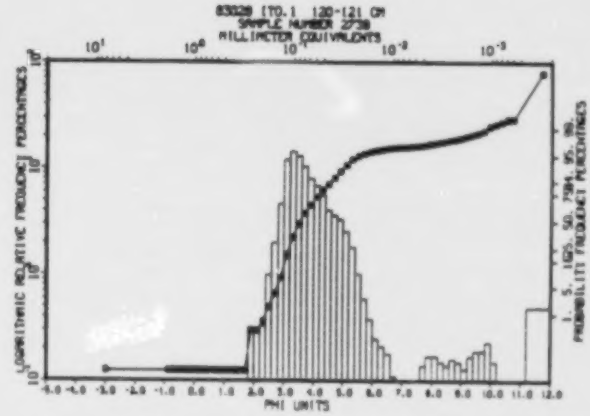
83028 ITO.1 110-112 CM
SAMPLE NUMBER 2736

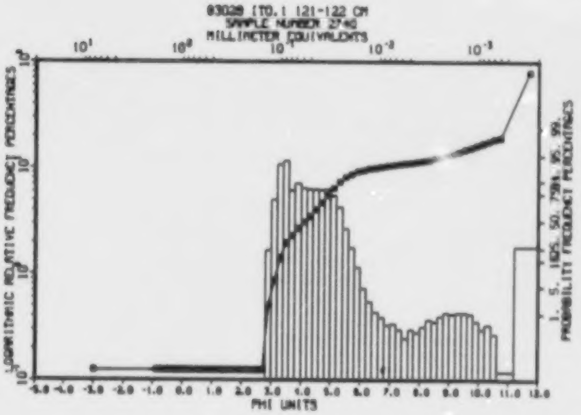


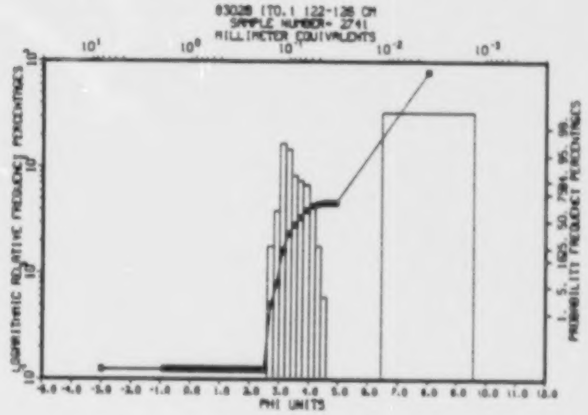
83028 ITO.1 116.5-117 CM
SAMPLE NUMBER 2737

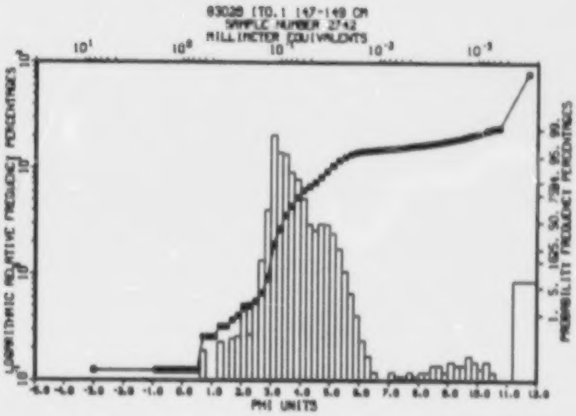


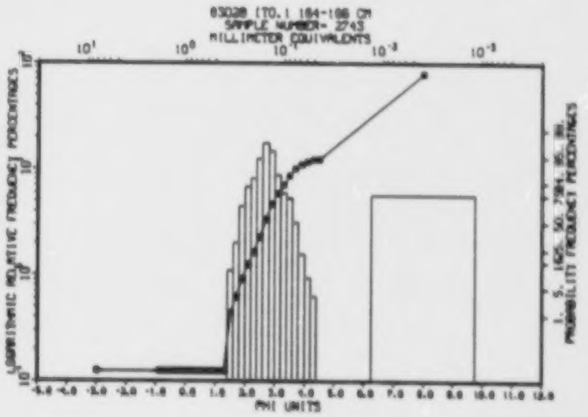

83028 (TO.1 117-118 CM
SAMPLE NUMBER 2738
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

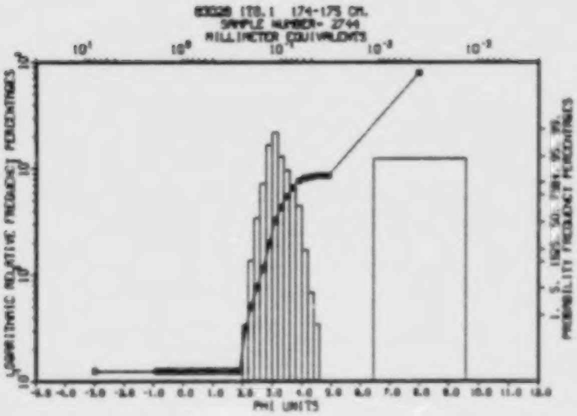

83028 (TO.1 120-121 CM
SAMPLE NUMBER 2739
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

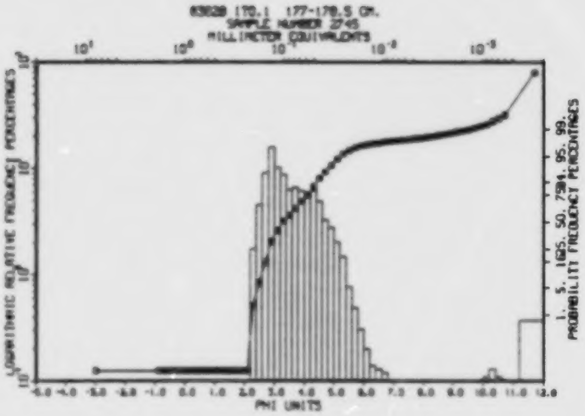

83028 (TO.1 121-122 CM
SAMPLE NUMBER 2740
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

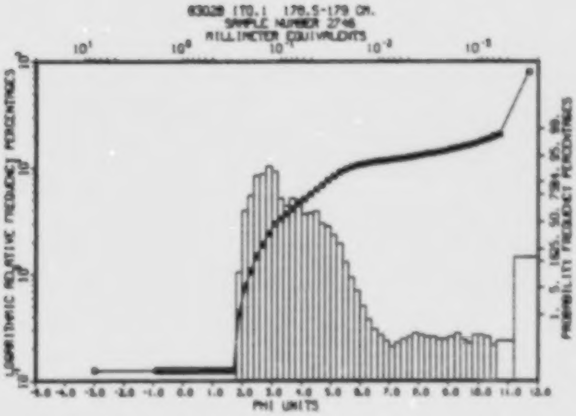

83028 (TO.1 122-126 CM
SAMPLE NUMBER= 2741
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

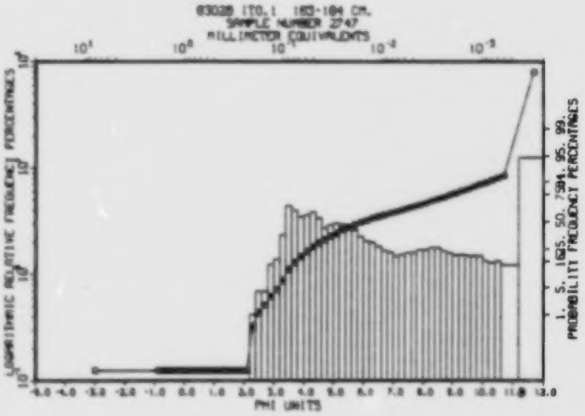

83028 (TO.1 147-149 CM
SAMPLE NUMBER 2742
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

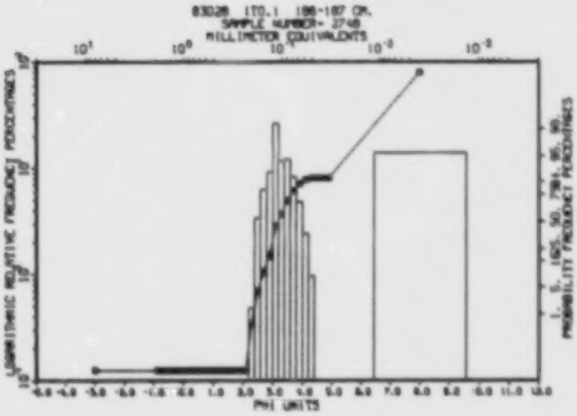

83028 (TO.1 184-186 CM
SAMPLE NUMBER= 2743
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

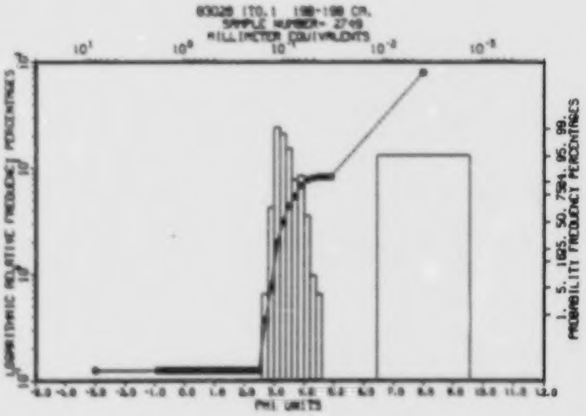

83028 ITO.1 174-175 CM.
SAMPLE NUMBER- 2744
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

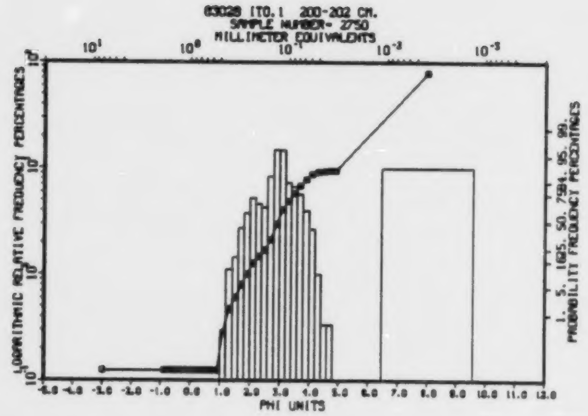

83028 ITO.1 177-178.5 CM.
SAMPLE NUMBER 2745
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

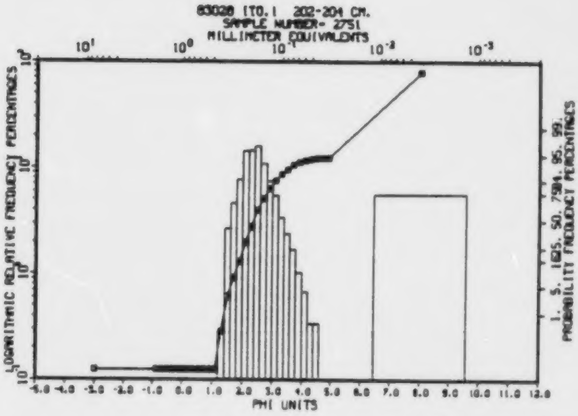

83028 ITO.1 178.5-179 CM.
SAMPLE NUMBER 2746
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

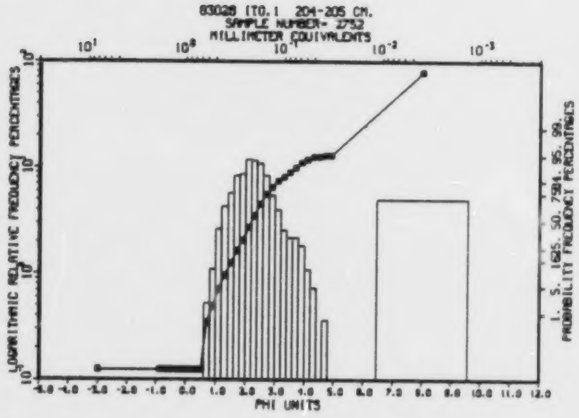

83028 ITO.1 183-184 CM.
SAMPLE NUMBER 2747
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

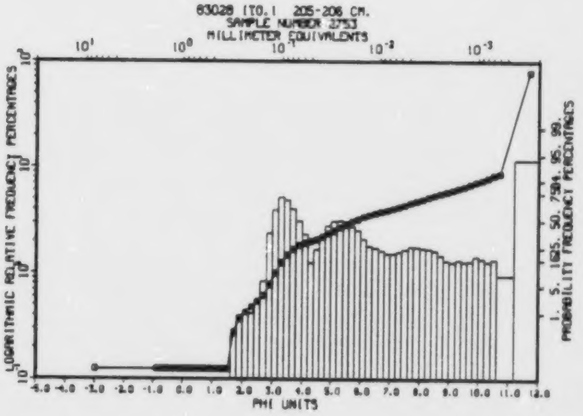

83028 ITO.1 186-187 CM.
SAMPLE NUMBER- 2748
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

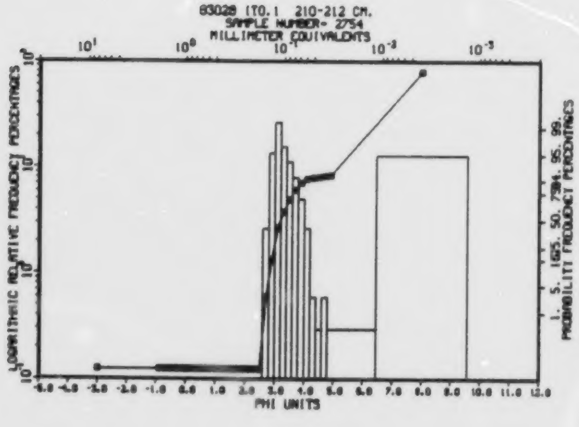

83028 ITO.1 188-189 CM.
SAMPLE NUMBER- 2749
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

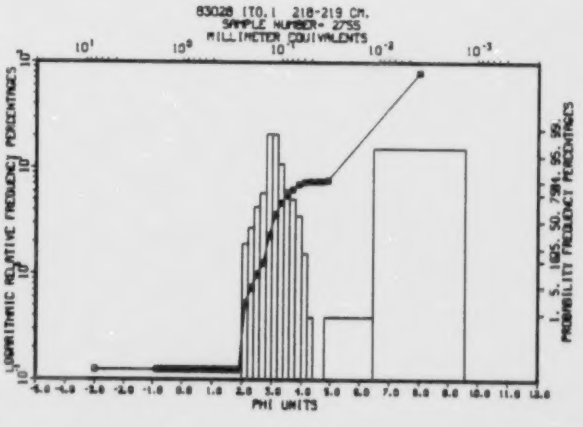

83028 ITO.1 200-202 CM.
SAMPLE NUMBER- 2750
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


83028 ITO.1 202-204 CM.
SAMPLE NUMBER- 2751
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

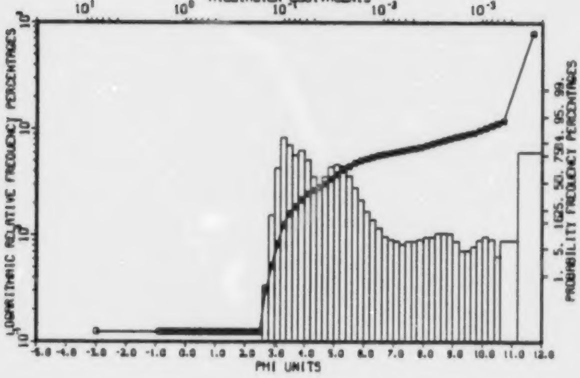

83028 ITO.1 204-205 CM.
SAMPLE NUMBER- 2752
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


83028 ITO.1 205-206 CM.
SAMPLE NUMBER 2753
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

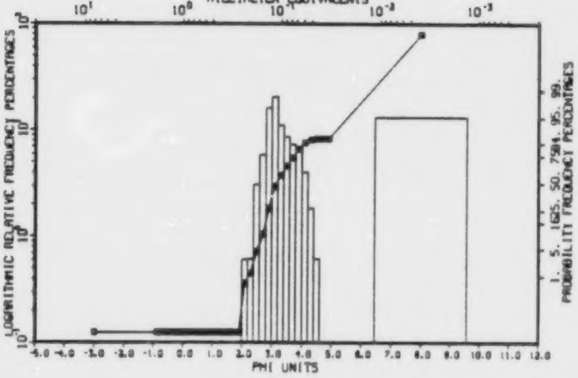

83028 ITO.1 210-212 CM.
SAMPLE NUMBER- 2754
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


83028 ITO.1 218-219 CM.
SAMPLE NUMBER- 2755
MILLIMETER EQUIVALENTS
10^1 10^0 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

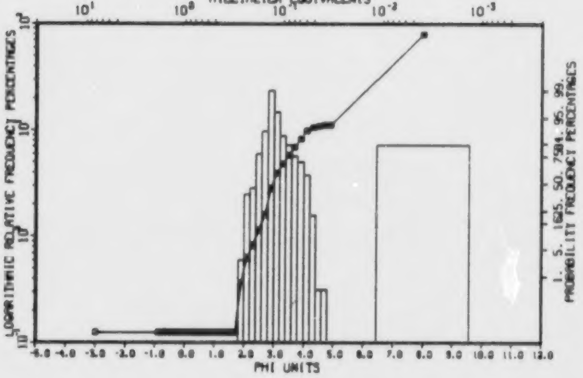
83028 ITO.1 235-237 CM.
SAMPLE NUMBER 2756



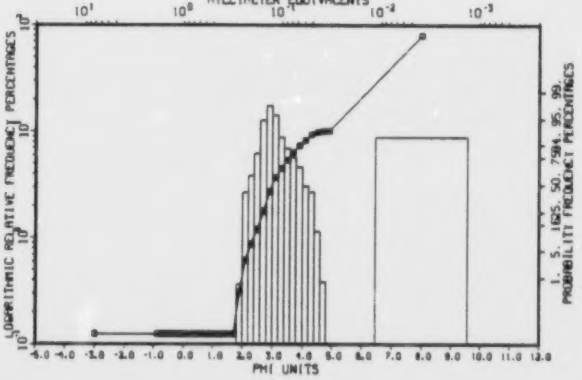
83028 ITO.1 237-238 CM.
SAMPLE NUMBER- 2757



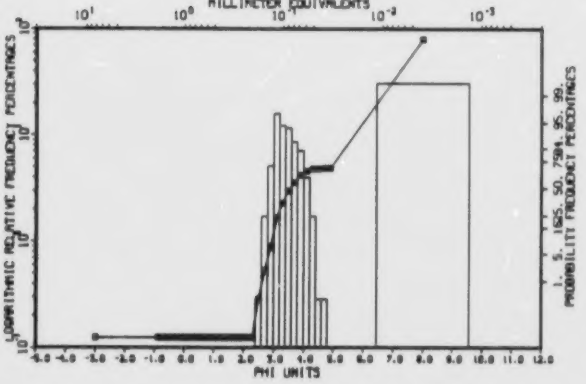
83028 ITO.1 238-239 CM.
SAMPLE NUMBER- 2758



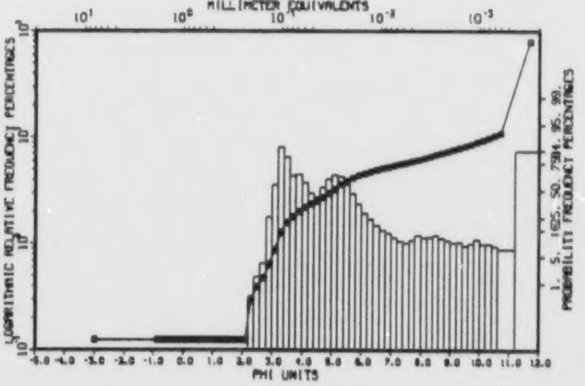
83028 ITO.1 239-240 CM.
SAMPLE NUMBER- 2759

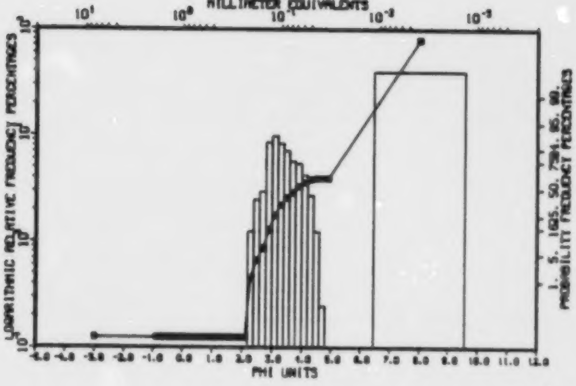


83028 ITO.1 240-242 CM.
SAMPLE NUMBER- 2760

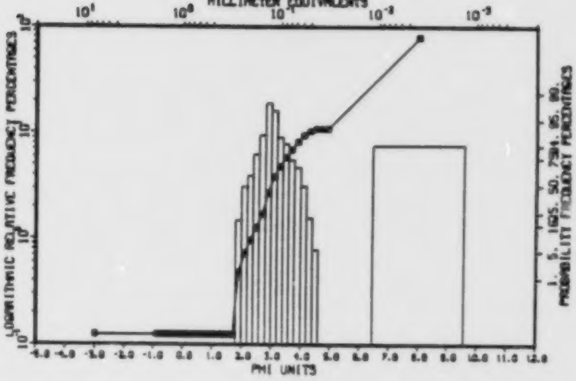


83028 ITO.1 242-243 CM.
SAMPLE NUMBER 2761

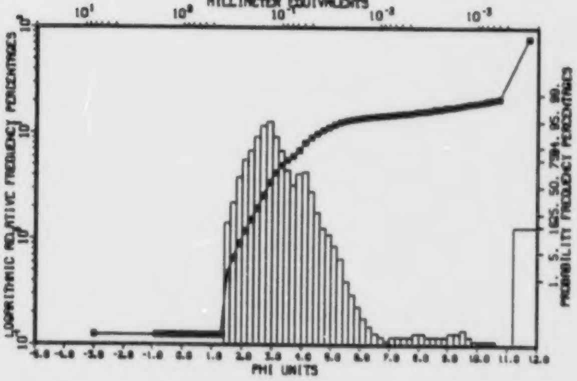




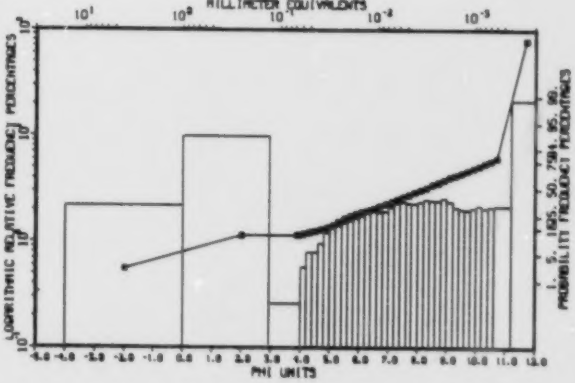
83028 ITO.3 0-1 CM.
SAMPLE NUMBER- 2762
MILLIMETER EQUIVALENTS



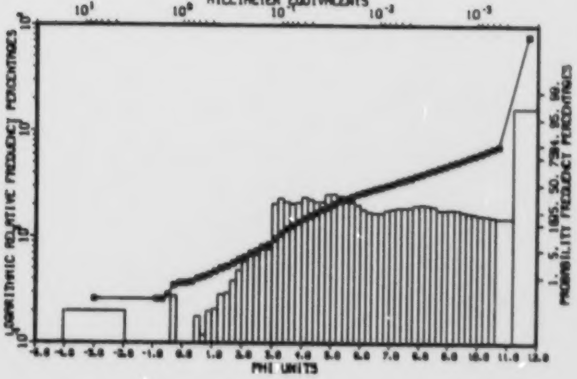
83028 ITO.3 20-22 CM.
SAMPLE NUMBER- 2763
MILLIMETER EQUIVALENTS



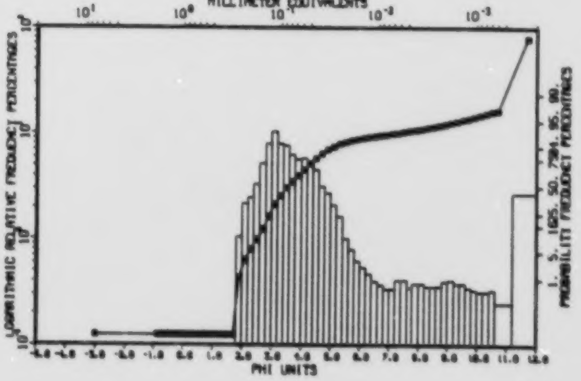
83028 ITO.3 30-32 CM.
SAMPLE NUMBER 2764
MILLIMETER EQUIVALENTS



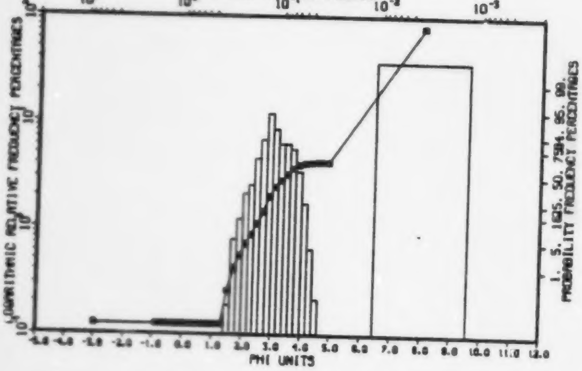
83028 ITO.3 45-48 CM.
SAMPLE NUMBER- 2765
MILLIMETER EQUIVALENTS

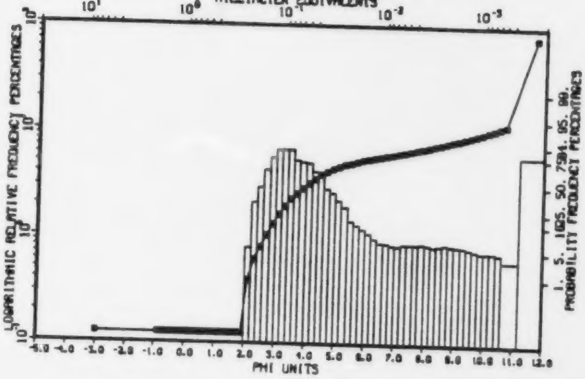


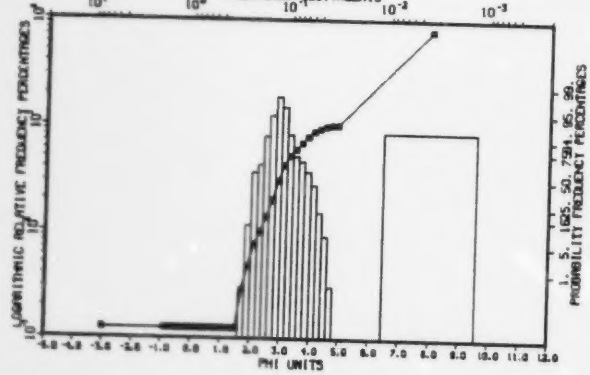
83028 ITO.3 55-56 CM.
SAMPLE NUMBER 2766
MILLIMETER EQUIVALENTS

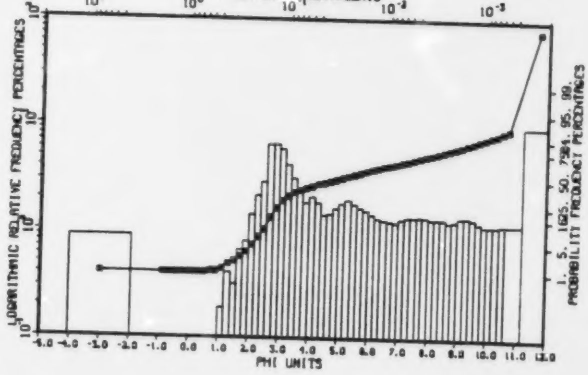


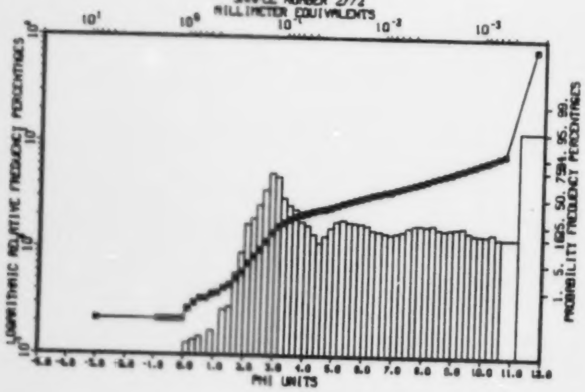
83028 ITO.3 65-67 CM.
SAMPLE NUMBER 2767
MILLIMETER EQUIVALENTS

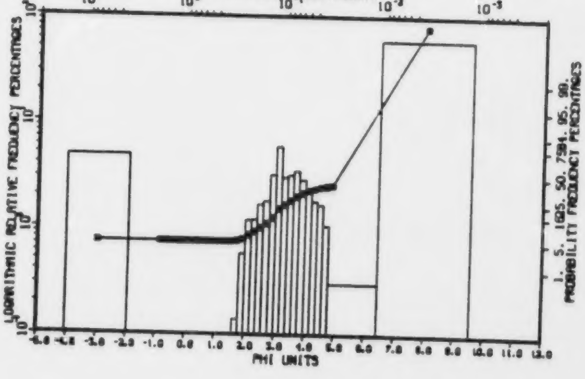

83028 ITO.3 80-82 CM.
SAMPLE NUMBER- 2768

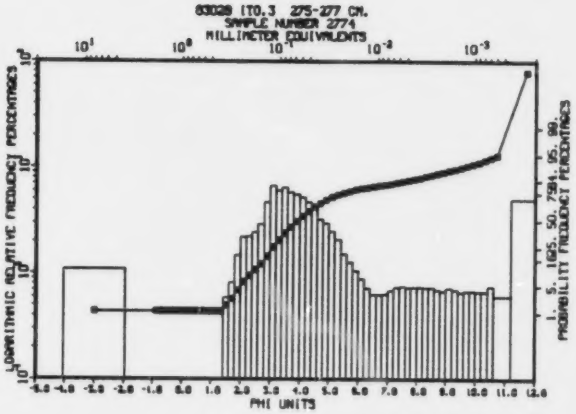

83028 ITO.3 100-102 CM.
SAMPLE NUMBER 2769

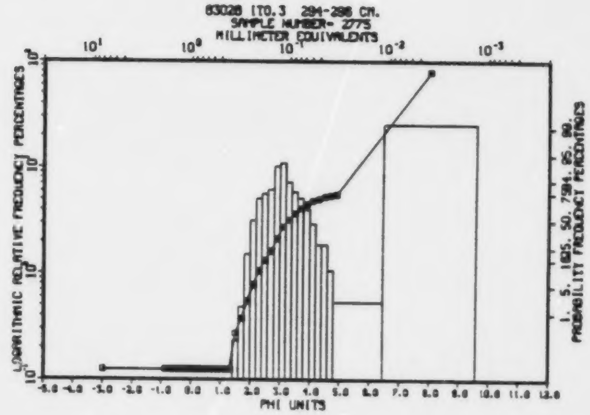

83028 ITO.3 120-122 CM.
SAMPLE NUMBER- 2770

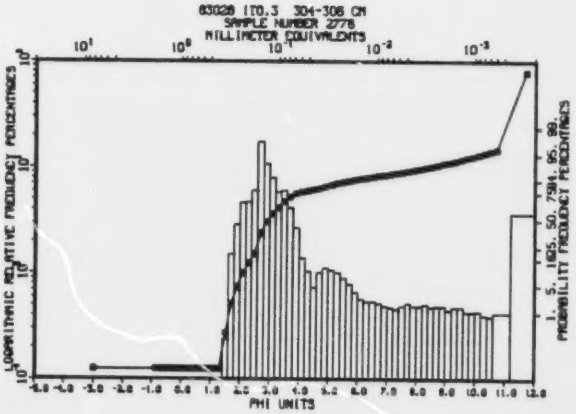

83028 ITO.3 175-177 CM.
SAMPLE NUMBER 2771

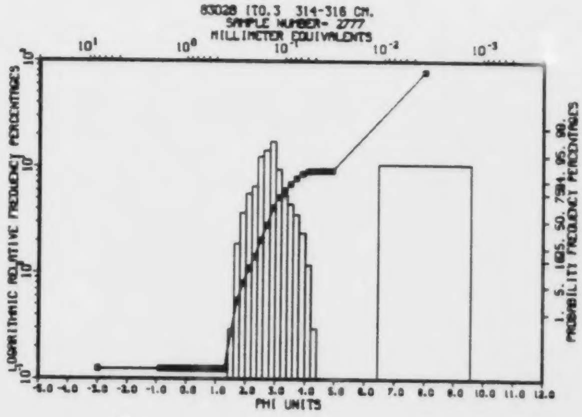

83028 ITO.3 203-205 CM.
SAMPLE NUMBER 2772

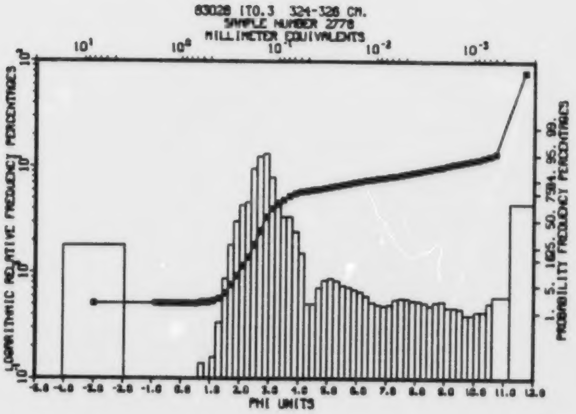

83028 ITO.3 253-255 CM.
SAMPLE NUMBER- 2773

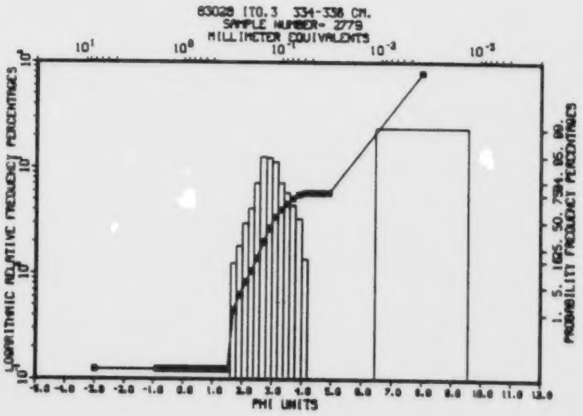

83028 ITO.3 275-277 CM.
SAMPLE NUMBER 2774


83028 ITO.3 294-296 CM.
SAMPLE NUMBER- 2775

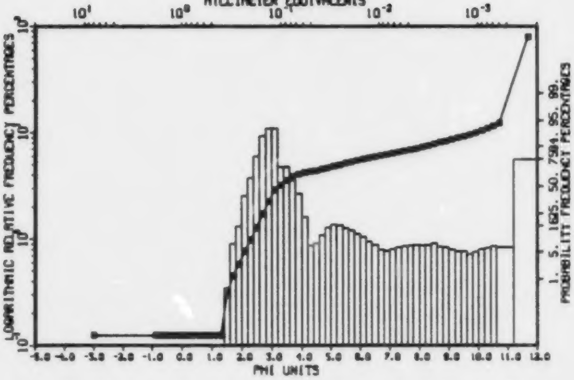

83028 ITO.3 304-306 CM
SAMPLE NUMBER 2776


83028 ITO.3 314-316 CM.
SAMPLE NUMBER- 2777

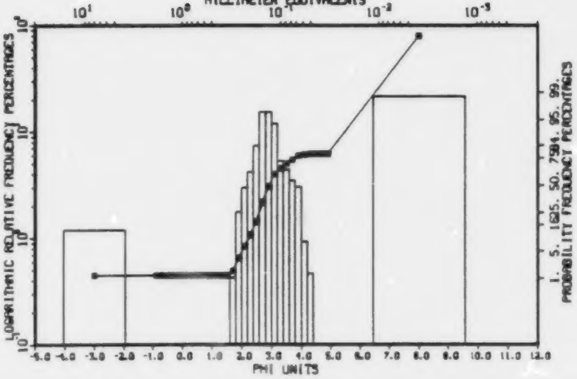

83028 ITO.3 324-326 CM.
SAMPLE NUMBER 2778


83028 ITO.3 334-336 CM.
SAMPLE NUMBER- 2779

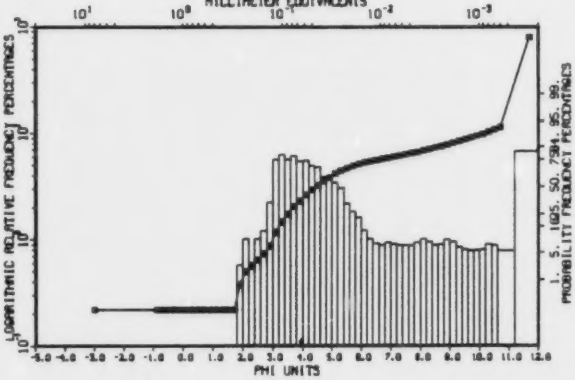
83028 ITO.3 344-346 CM.
SAMPLE NUMBER 2780



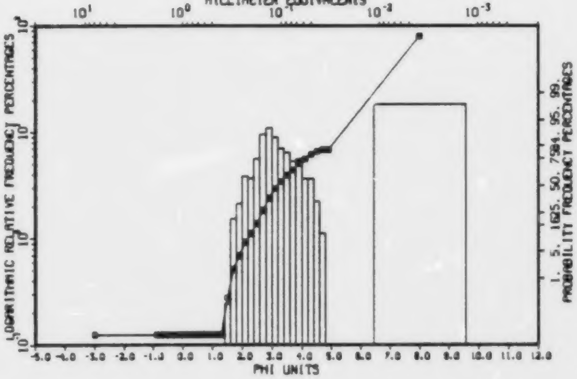
83028 ITO.3 354-356 CM.
SAMPLE NUMBER- 2781



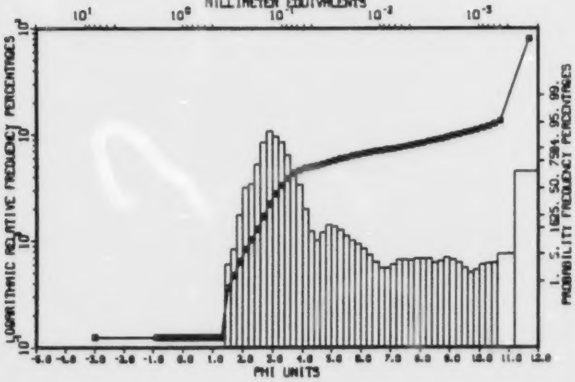
83028 ITO.3 364-366 CM.
SAMPLE NUMBER 2782



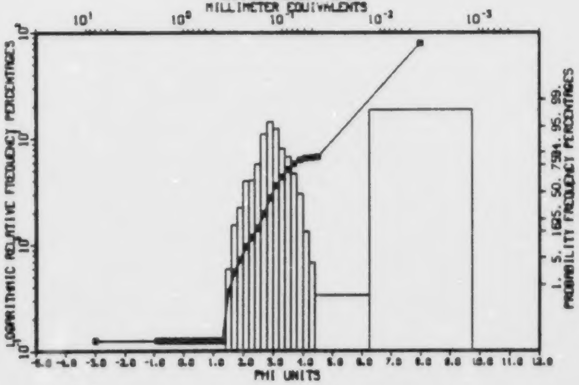
83028 ITO.3 374-376 CM.
SAMPLE NUMBER- 2783

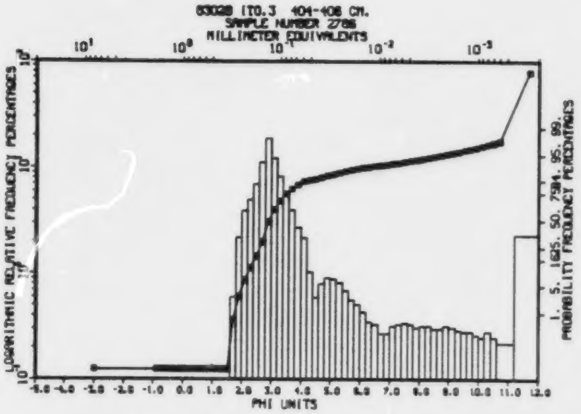


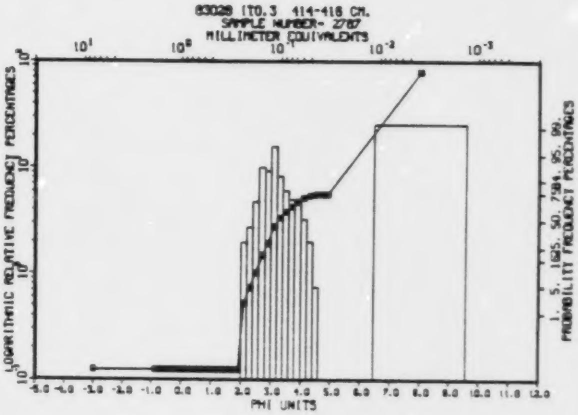
83028 ITO.3 384-386 CM.
SAMPLE NUMBER 2784

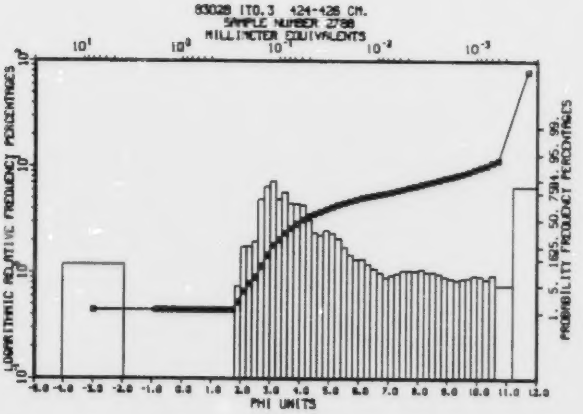


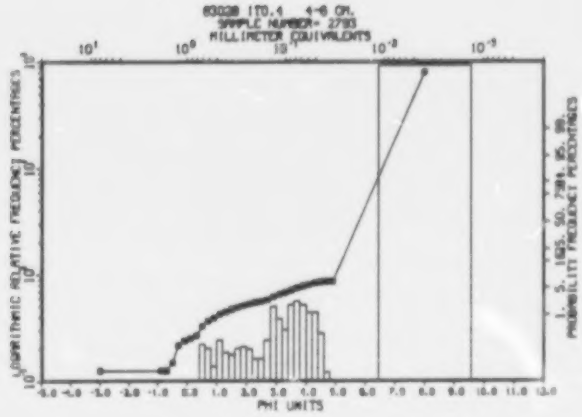
83028 ITO.3 394-396 CM.
SAMPLE NUMBER- 2785

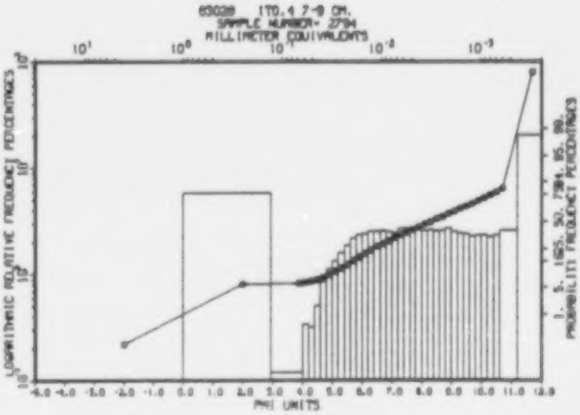


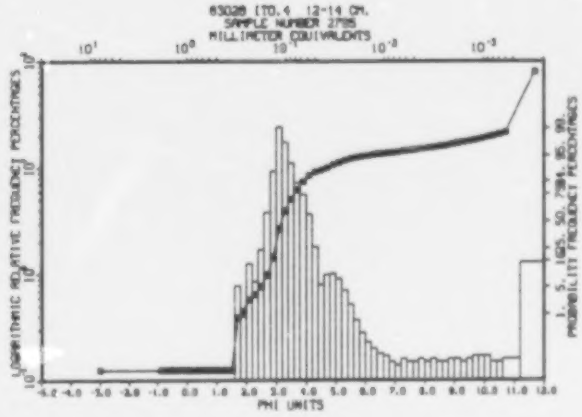

83028 ITO.3 404-406 CM.
SAMPLE NUMBER 2786

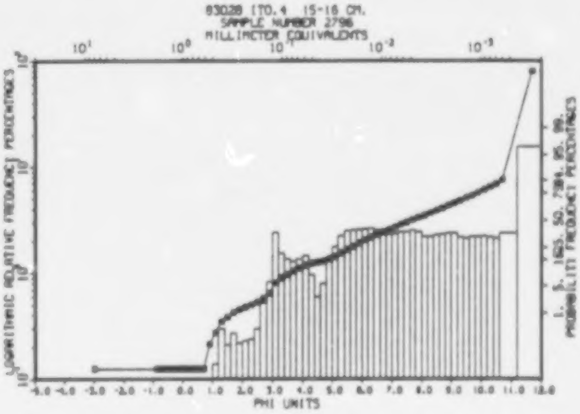

83028 ITO.3 414-416 CM.
SAMPLE NUMBER- 2787

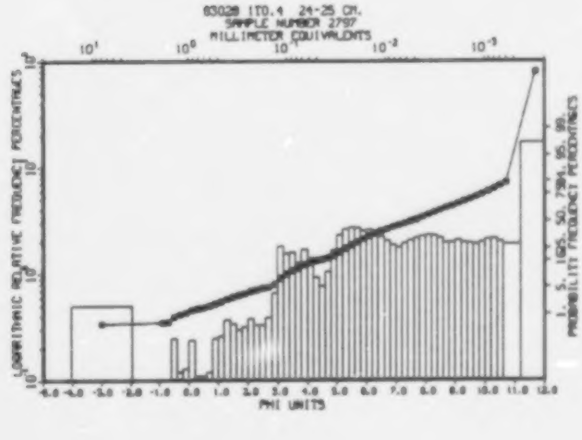

83028 ITO.3 424-426 CM.
SAMPLE NUMBER 2788

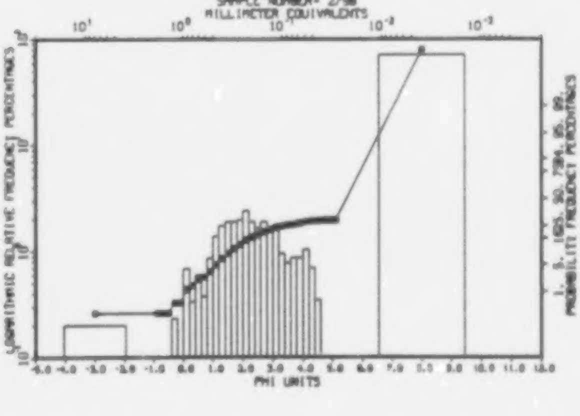

83028 ITO.4 4-6 CM.
SAMPLE NUMBER= 2793
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

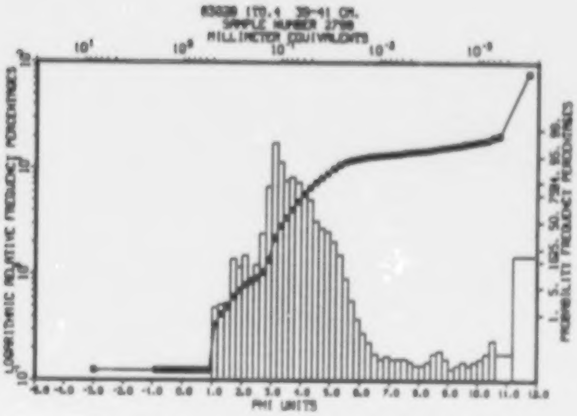

83028 ITO.4 7-9 CM.
SAMPLE NUMBER= 2794
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

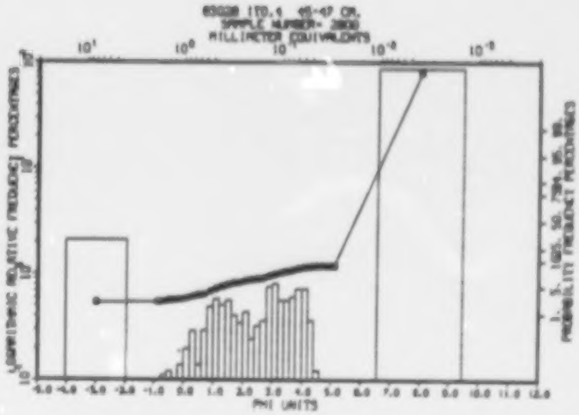

83028 ITO.4 12-14 CM.
SAMPLE NUMBER 2795
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

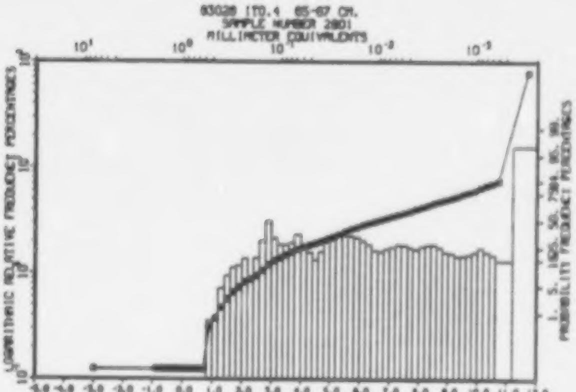

83028 ITO.4 15-16 CM.
SAMPLE NUMBER 2796
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

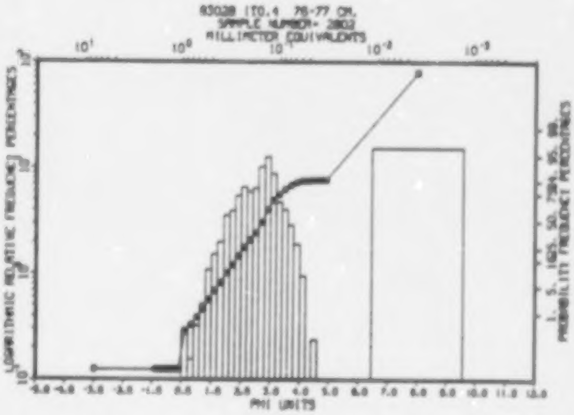

83028 ITO.4 24-25 CM.
SAMPLE NUMBER 2797
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

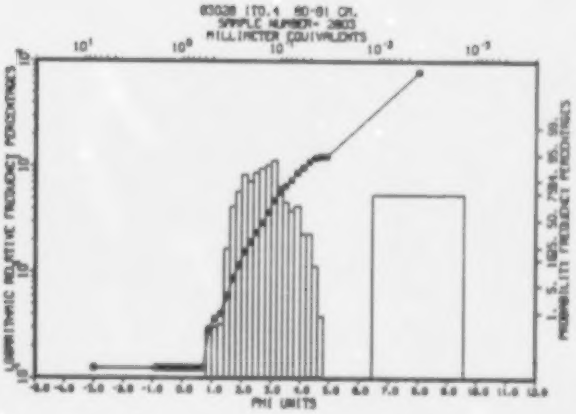

83028 ITO.4 34-35 CM.
SAMPLE NUMBER= 2798
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

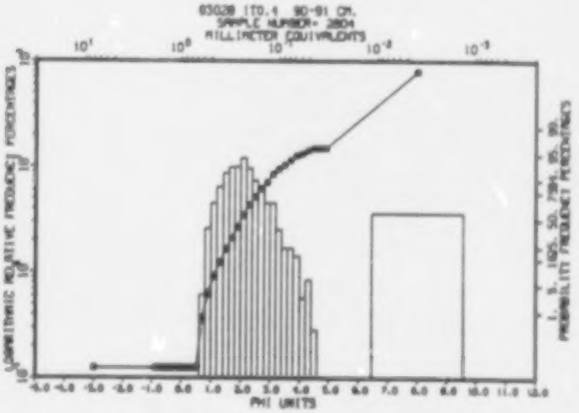

83028 ITD.4 39-41 CM.
SAMPLE NUMBER 2799
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

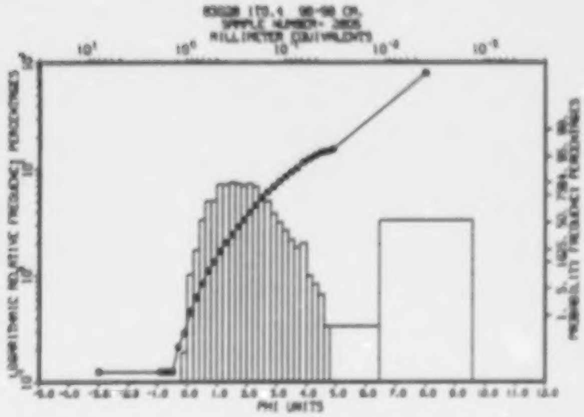

83028 ITD.4 45-47 CM.
SAMPLE NUMBER- 2800
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

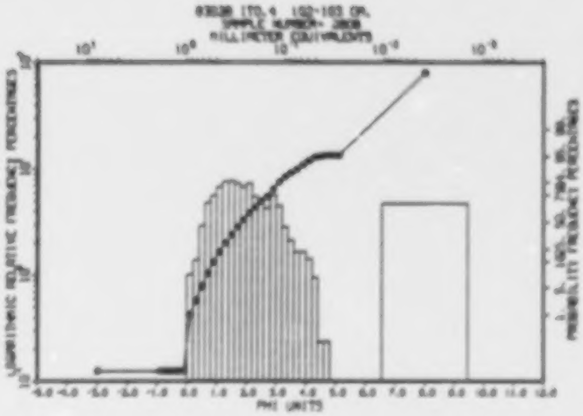

83028 ITD.4 65-67 CM.
SAMPLE NUMBER 2801
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

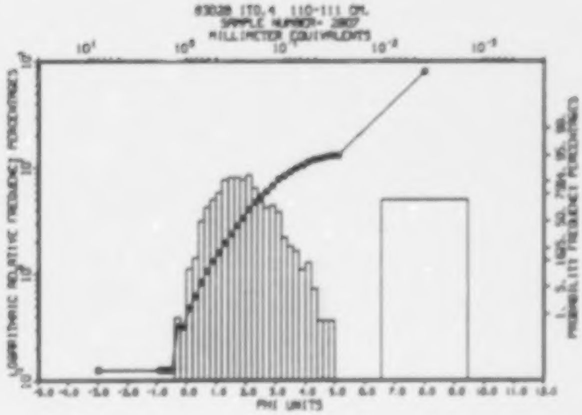

83028 ITD.4 76-77 CM.
SAMPLE NUMBER- 2802
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

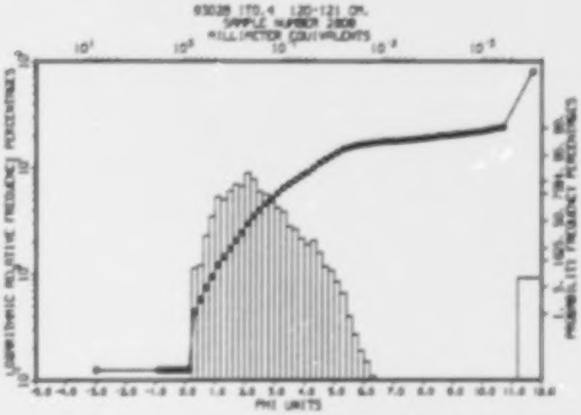

83028 ITD.4 80-81 CM.
SAMPLE NUMBER- 2803
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

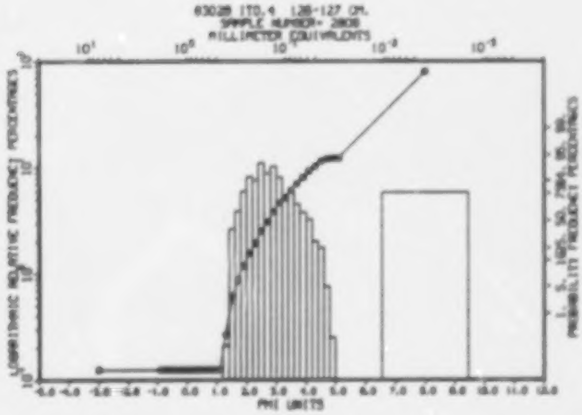

83028 ITD.4 90-91 CM.
SAMPLE NUMBER- 2804
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

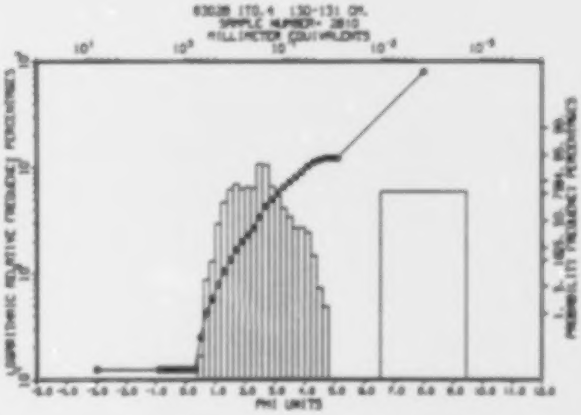

83028 ITO.4 98-99 CM.
SAMPLE NUMBER= 2805
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

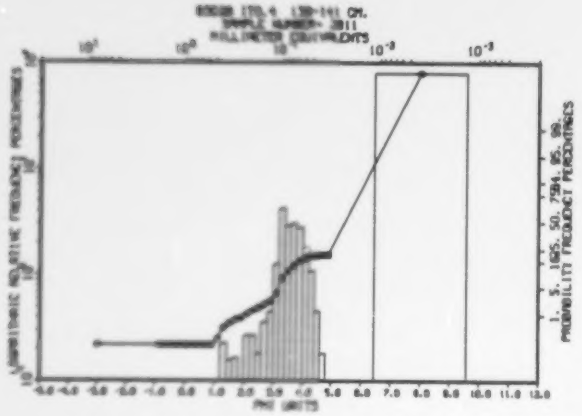

83028 ITO.4 102-103 CM.
SAMPLE NUMBER= 2806
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

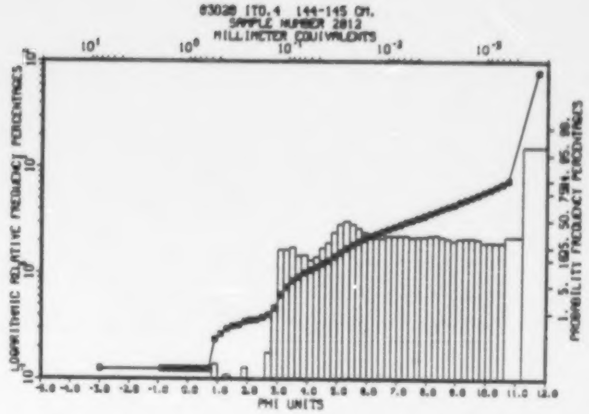

83028 ITO.4 110-111 CM.
SAMPLE NUMBER= 2807
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

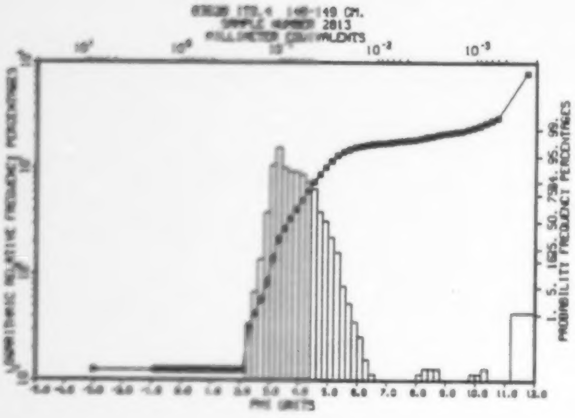

83028 ITO.4 120-121 CM.
SAMPLE NUMBER 2808
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

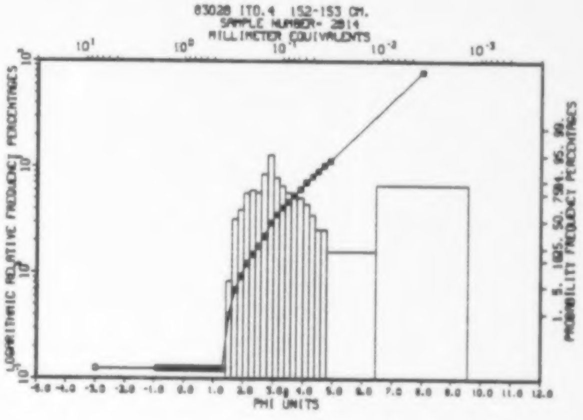

83028 ITO.4 126-127 CM.
SAMPLE NUMBER= 2809
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

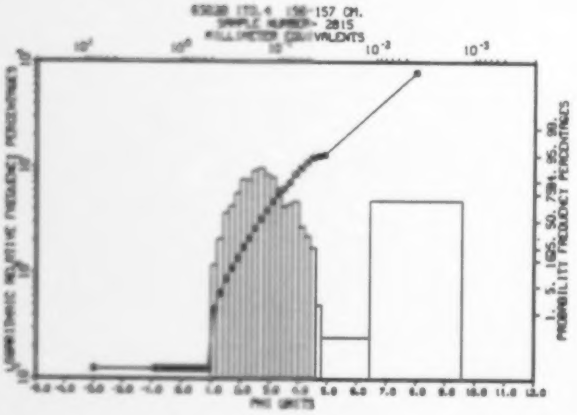

83028 ITO.4 130-131 CM.
SAMPLE NUMBER= 2810
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

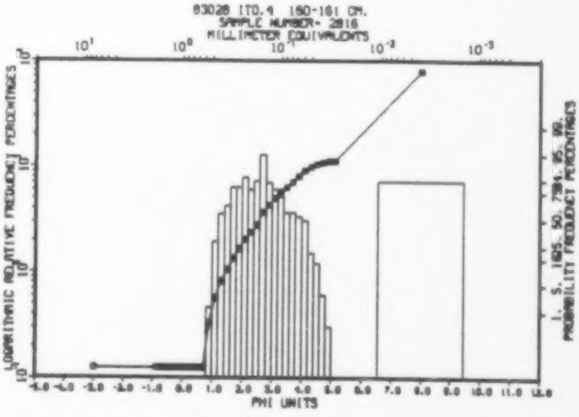

83028 ITD.4 140-141 CM.
SAMPLE NUMBER- 2811
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PHI UNITS


83028 ITD.4 144-145 CM.
SAMPLE NUMBER 2812
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

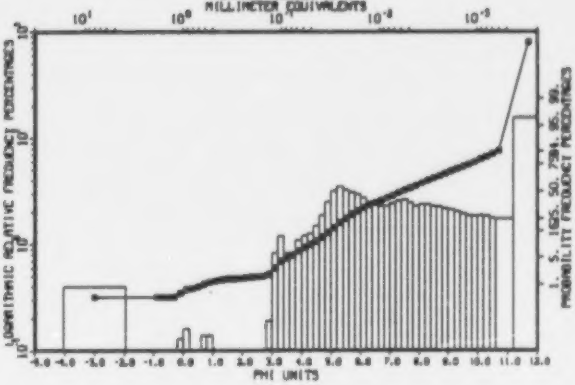

83028 ITD.4 148-149 CM.
SAMPLE NUMBER 2813
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PHI UNITS


83028 ITD.4 152-153 CM.
SAMPLE NUMBER- 2814
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

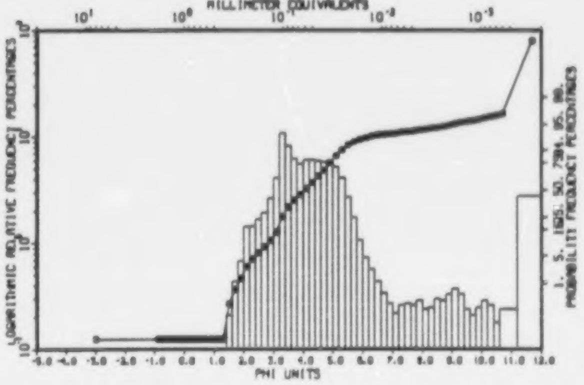

83028 ITD.4 156-157 CM.
SAMPLE NUMBER- 2815
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
PHI UNITS


83028 ITD.4 160-161 CM.
SAMPLE NUMBER- 2816
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

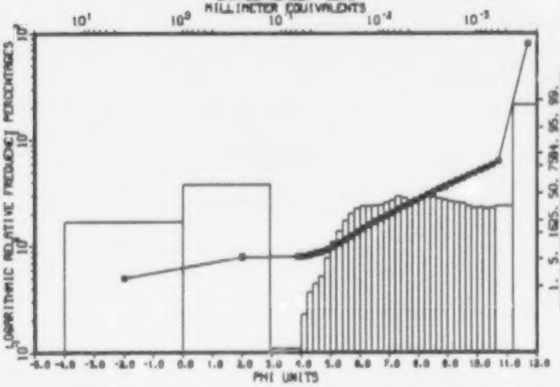
83028 ITO.4 174-175 CM.
SAMPLE NUMBER 2817



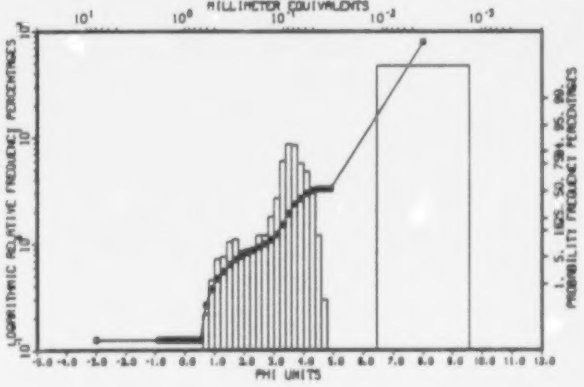
83028 ITO.4 175.5-176 CM.
SAMPLE NUMBER 2818



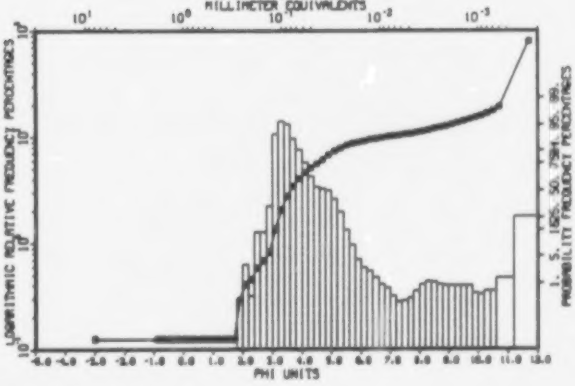
83028 ITO.4 178-179 CM
SAMPLE NUMBER- 2819



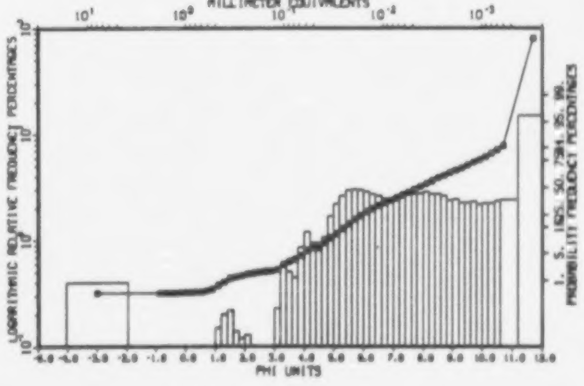
83028 ITO.4 180-181 CM.
SAMPLE NUMBER- 2820

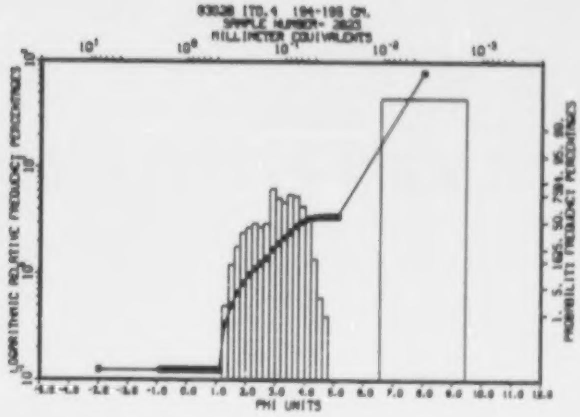


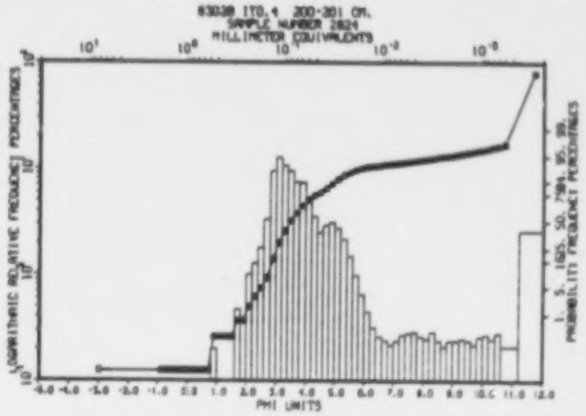
83028 ITO.4 185-186 CM.
SAMPLE NUMBER 2821

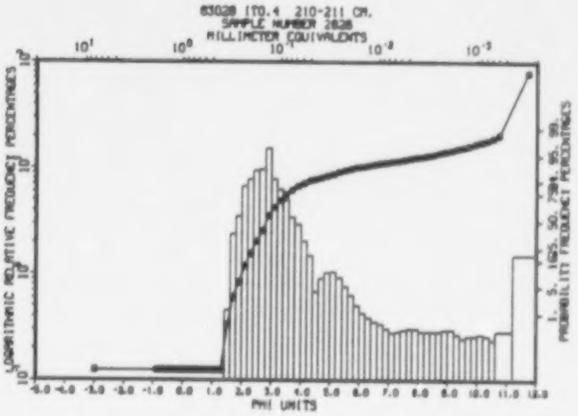


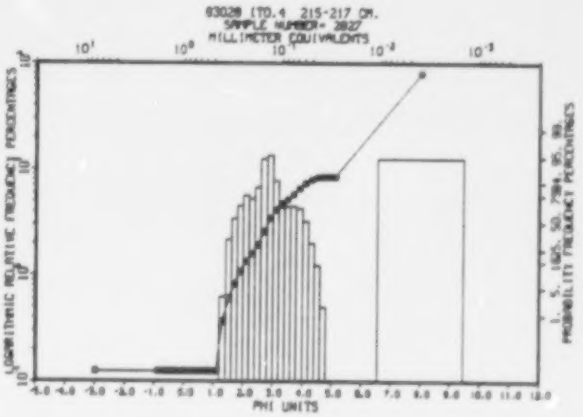
83028 ITO.4 190-191 CM.
SAMPLE NUMBER 2822

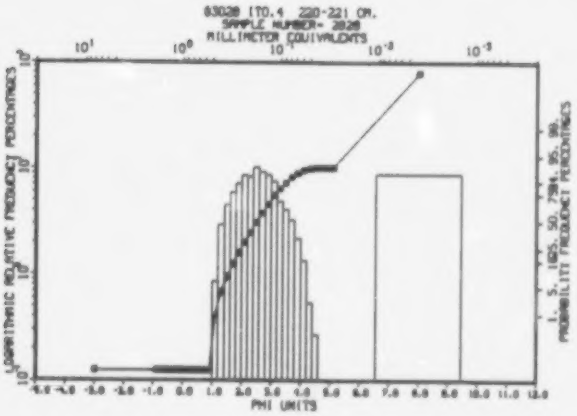


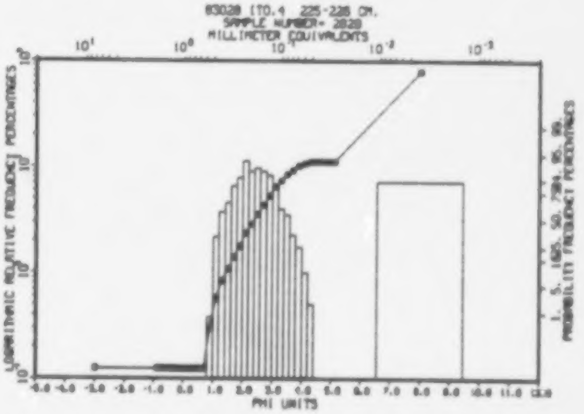

83028 ITO.4 194-196 CM.
SAMPLE NUMBER- 2823
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

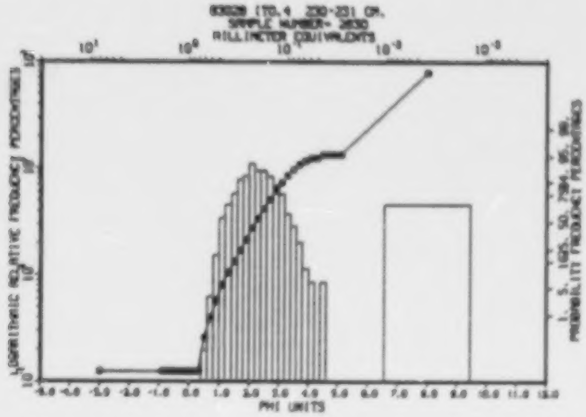

83028 ITO.4 200-201 CM.
SAMPLE NUMBER 2824
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

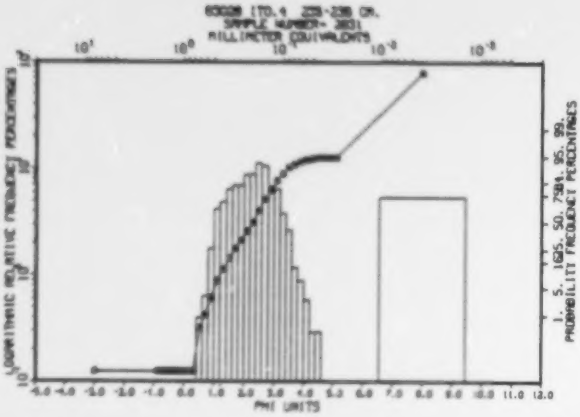

83028 ITO.4 210-211 CM.
SAMPLE NUMBER 2826
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

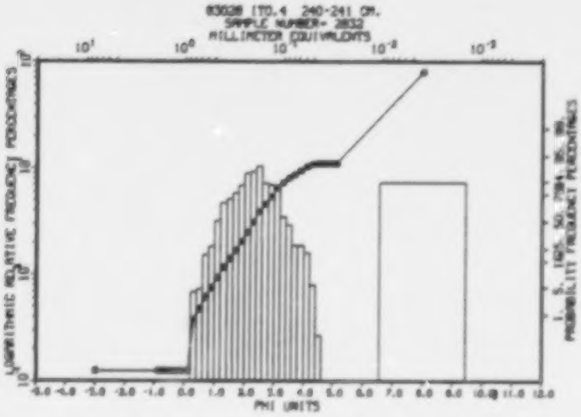

83028 ITO.4 215-217 CM.
SAMPLE NUMBER- 2827
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

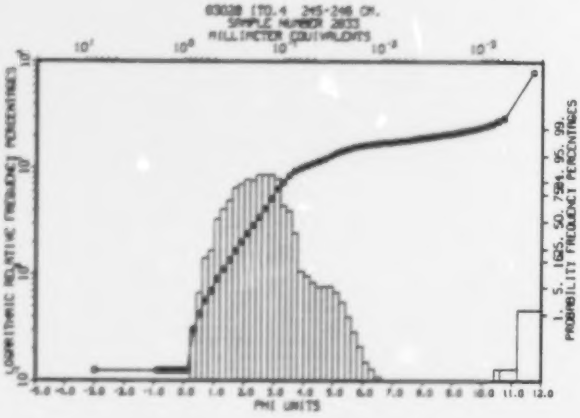

83028 ITO.4 220-221 CM.
SAMPLE NUMBER- 2828
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

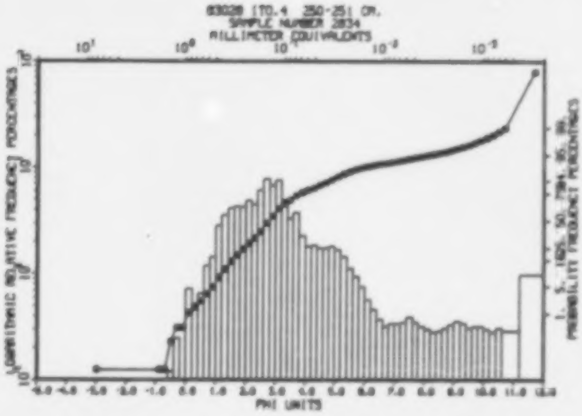

83028 ITO.4 225-226 CM.
SAMPLE NUMBER- 2829
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

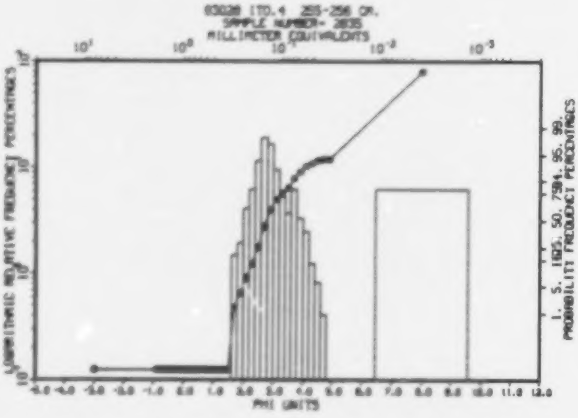

83028 ITD.4 230-231 CM.
SAMPLE NUMBER- 2830
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

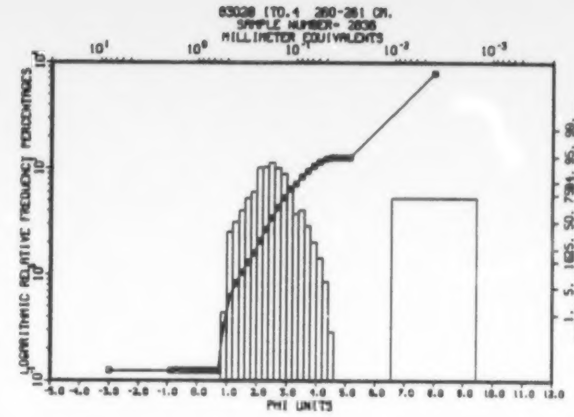

83028 ITD.4 235-236 CM.
SAMPLE NUMBER- 2831
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

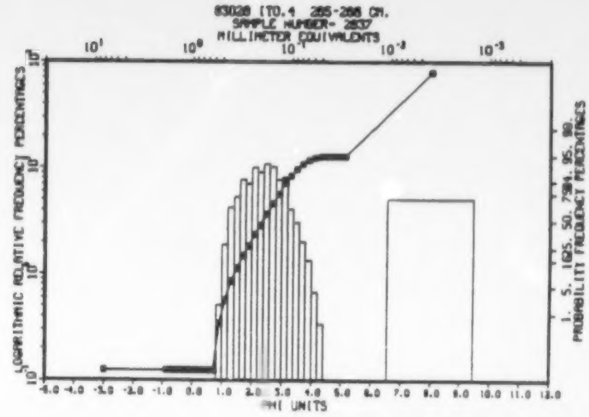

83028 ITD.4 240-241 CM.
SAMPLE NUMBER- 2832
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

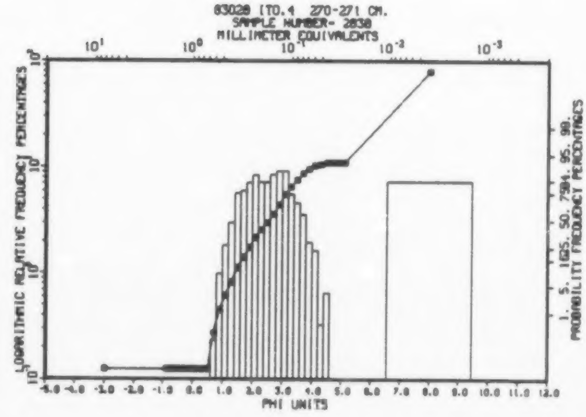

83028 ITD.4 245-246 CM.
SAMPLE NUMBER 2833
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

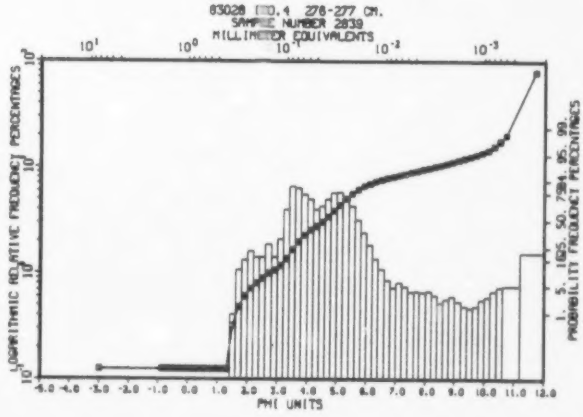

83028 ITD.4 250-251 CM.
SAMPLE NUMBER 2834
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

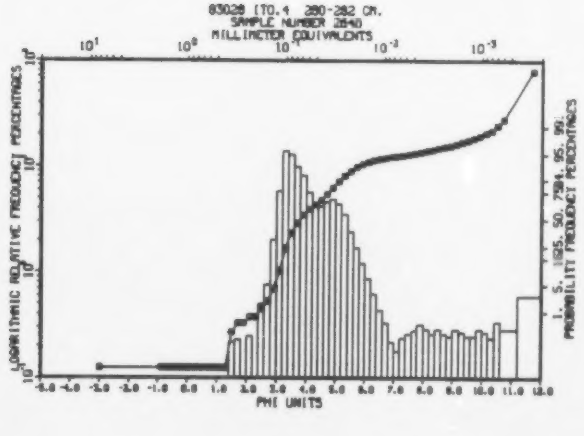

83028 ITD.4 255-256 CM.
SAMPLE NUMBER- 2835
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

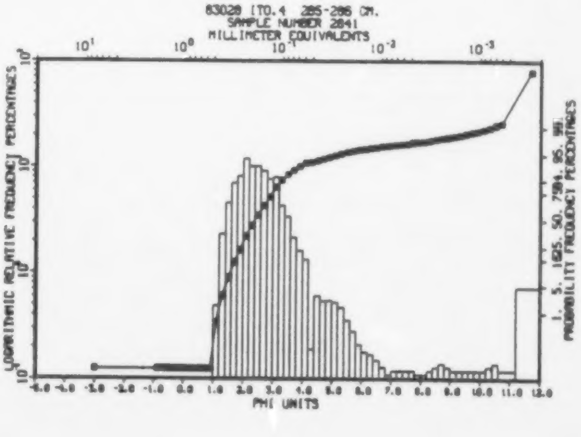

83028 ITO.4 260-261 CM.
SAMPLE NUMBER- 2836


83028 ITO.4 265-266 CM.
SAMPLE NUMBER- 2837

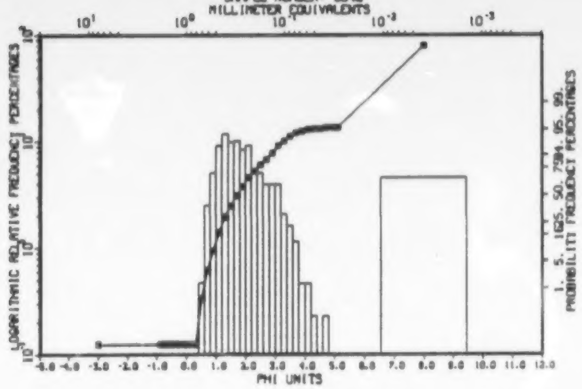

83028 ITO.4 270-271 CM.
SAMPLE NUMBER- 2838


83028 ITO.4 276-277 CM.
SAMPLE NUMBER 2839

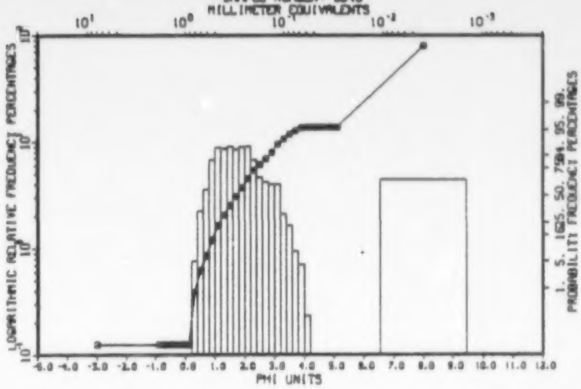

83028 ITO.4 280-282 CM.
SAMPLE NUMBER 2840


83028 ITO.4 285-286 CM.
SAMPLE NUMBER 2841

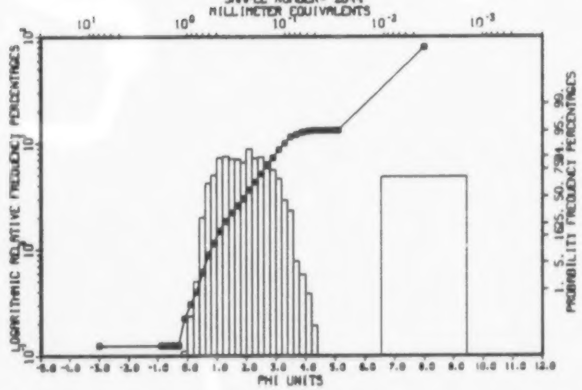
83028 ITO.4 290-291 CM.
SAMPLE NUMBER- 2842



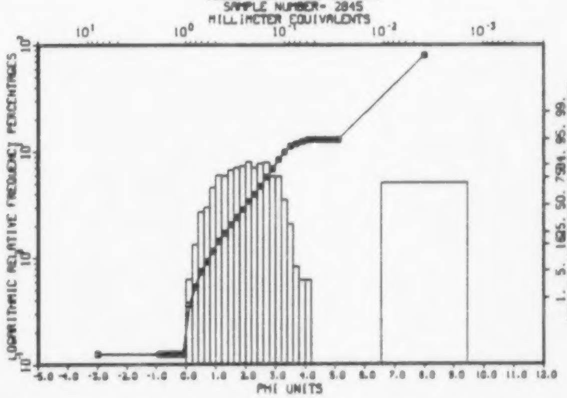
83028 ITO.4 295-296 CM.
SAMPLE NUMBER- 2843



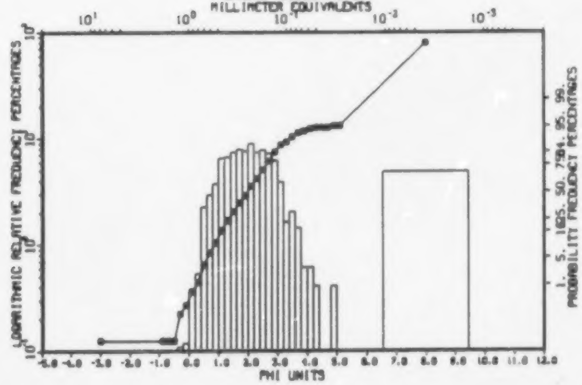
83028 ITO.4 300-301 CM.
SAMPLE NUMBER- 2844



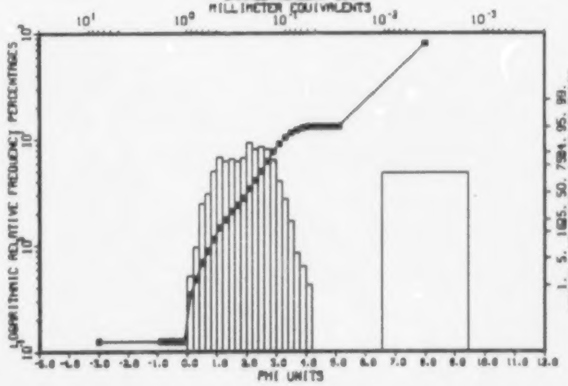
83028 ITO.4 305-306 CM.
SAMPLE NUMBER- 2845

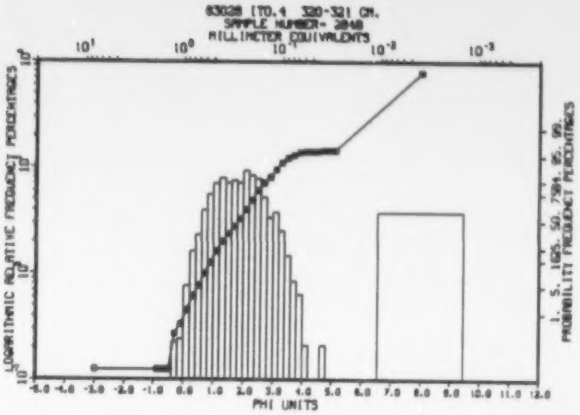


83028 ITO.4 310-311 CM.
SAMPLE NUMBER- 2846

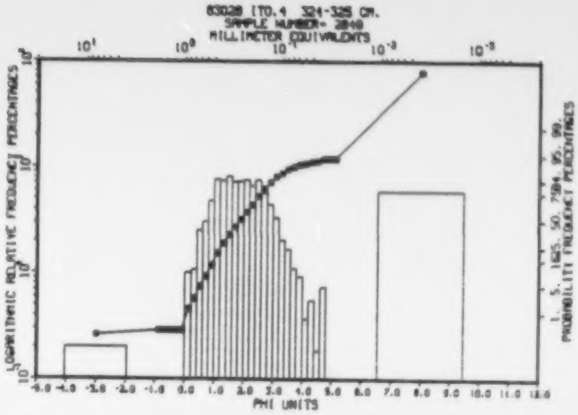


83028 ITO.4 315-317 CM.
SAMPLE NUMBER- 2847



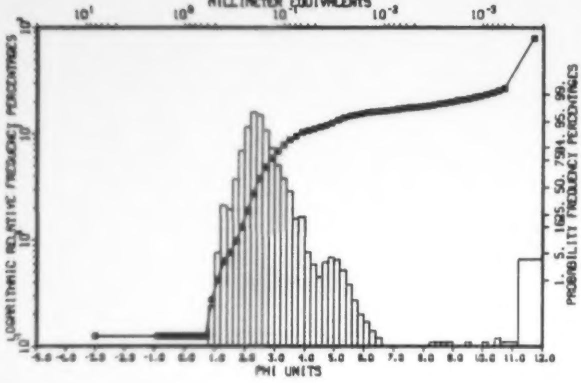


83028 ITD.4 320-321 CM.
SAMPLE NUMBER- 2848
MILLIMETER EQUIVALENTS
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^0
10^1
10^2
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

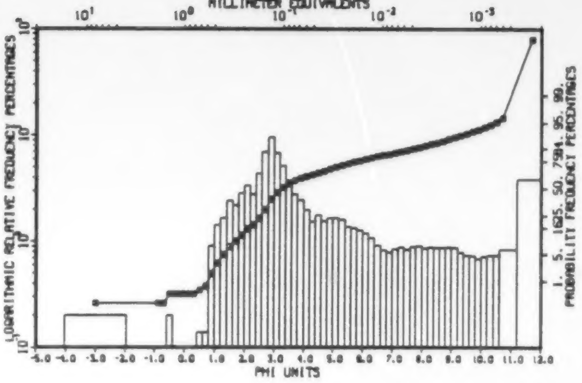


83028 ITD.4 324-325 CM.
SAMPLE NUMBER- 2849
MILLIMETER EQUIVALENTS
10^1
10^0
10^{-1}
10^{-2}
10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^0
10^1
10^2
1. 5. 1625. 50. 7584. 95. 99.
PROBABILITY FREQUENCY PERCENTAGES
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

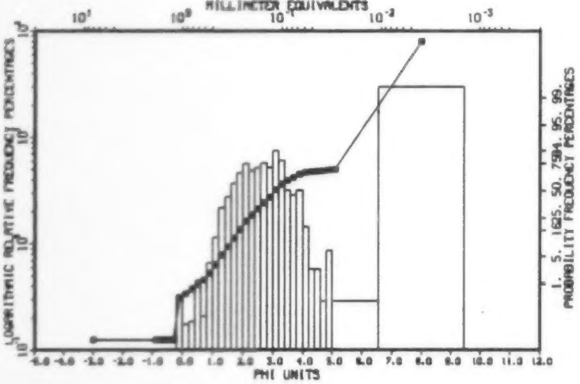
83028 [T1.2 9-10 CM.
SAMPLE NUMBER 2850



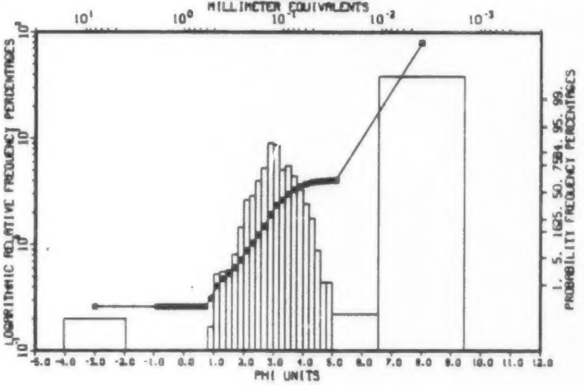
83028 [T1.2 40-41 CM.
SAMPLE NUMBER 2851



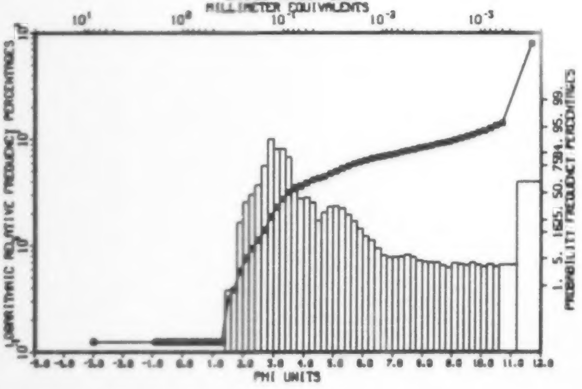
83028 [T1.2 49-50 CM.
SAMPLE NUMBER- 2852



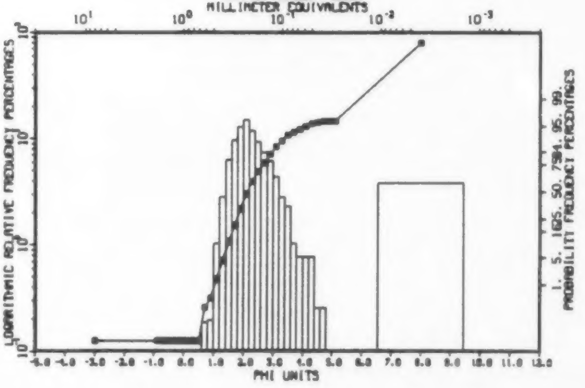
83028 [T1.1 60-61 CM.
SAMPLE NUMBER- 2853



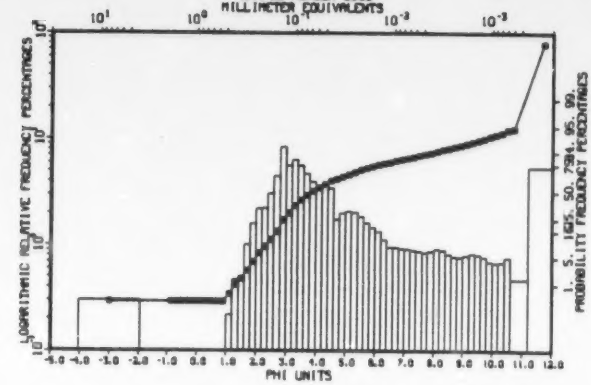
83028 [T1.2 75-76 CM.
SAMPLE NUMBER 2854



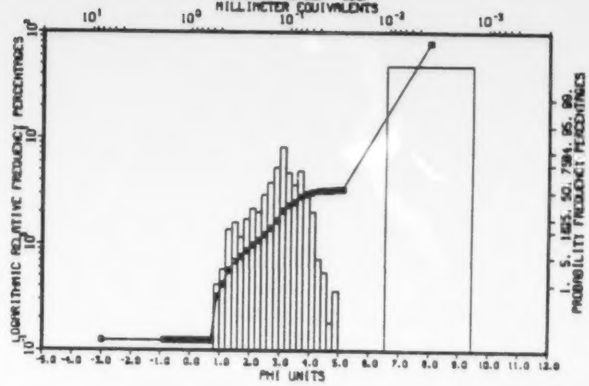
83028 [T1.2 81-82 CM.
SAMPLE NUMBER- 2855



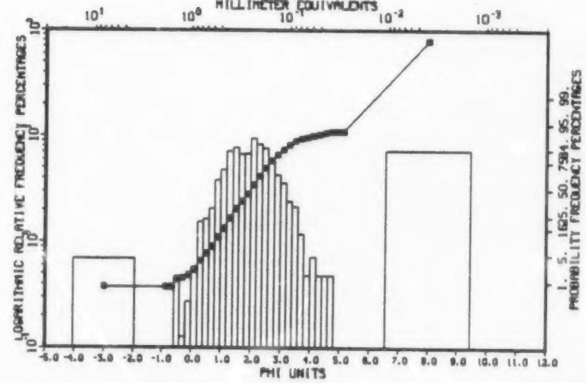
83028 IT1.2 82-83 CM.
SAMPLE NUMBER 2856



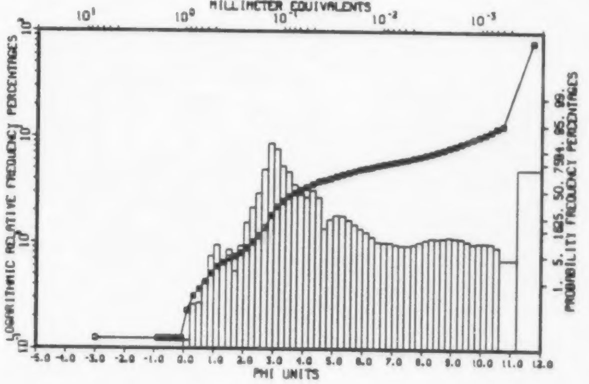
83028 IT1.2 105-106 CM.
SAMPLE NUMBER- 2857



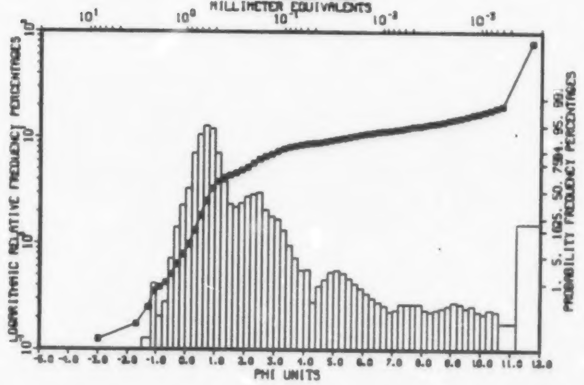
83028 IT1.2 112-113 CM.
SAMPLE NUMBER- 2858



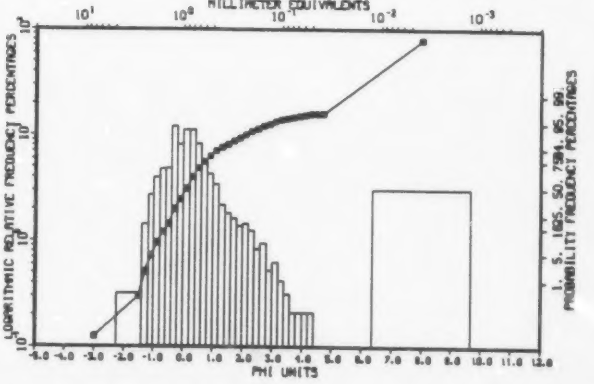
83028 IT1.2 119-120 CM.
SAMPLE NUMBER 2859

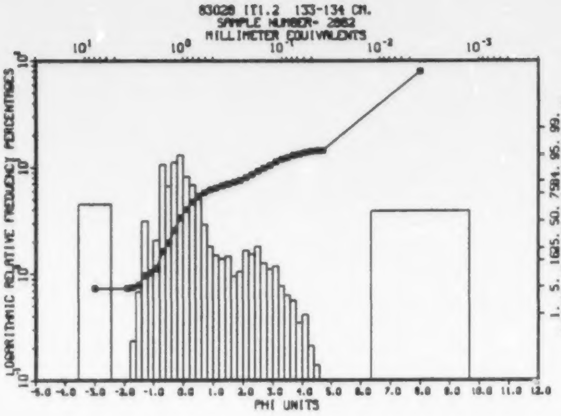


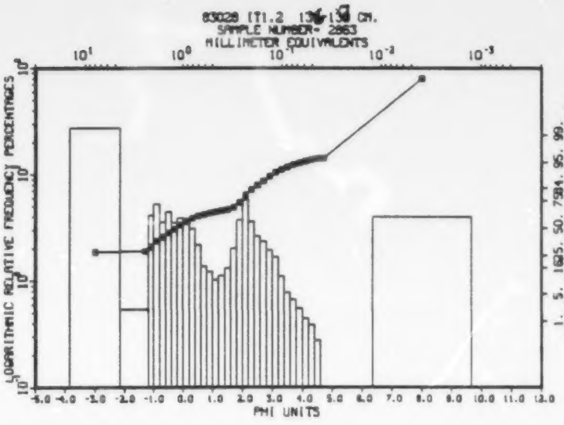
83028 IT1.2 121-122 CM.
SAMPLE NUMBER 2860

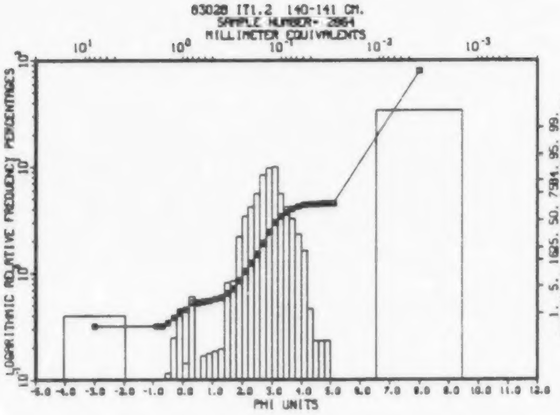


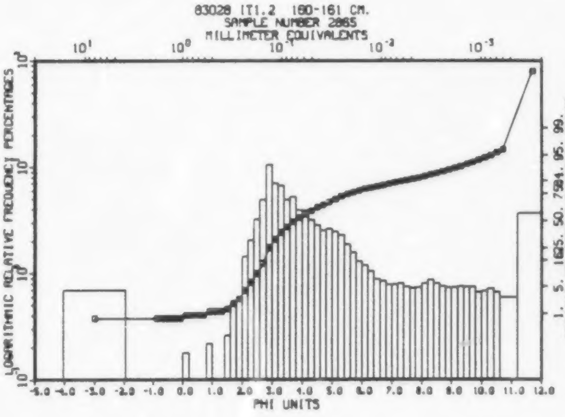
83028 IT1.2 127-128 CM.
SAMPLE NUMBER- 2861

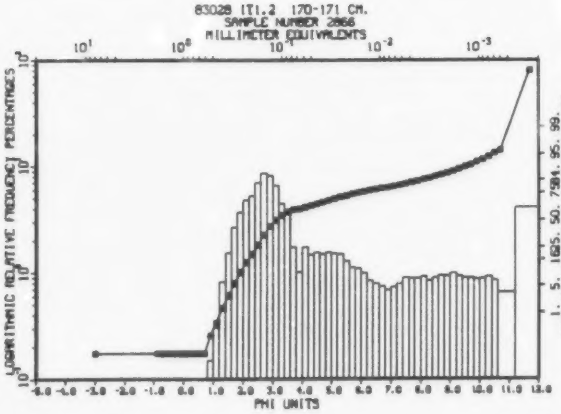


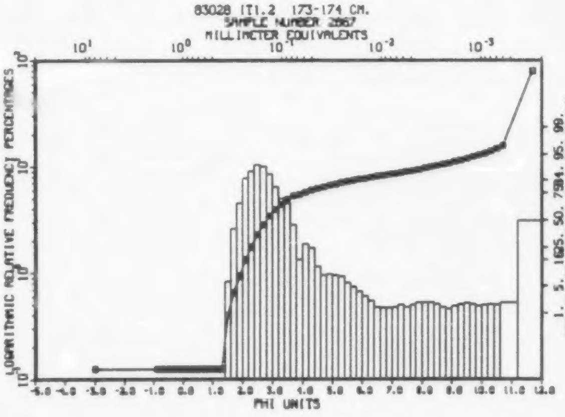

83028 IT1.2 133-134 CM.
SAMPLE NUMBER- 2862

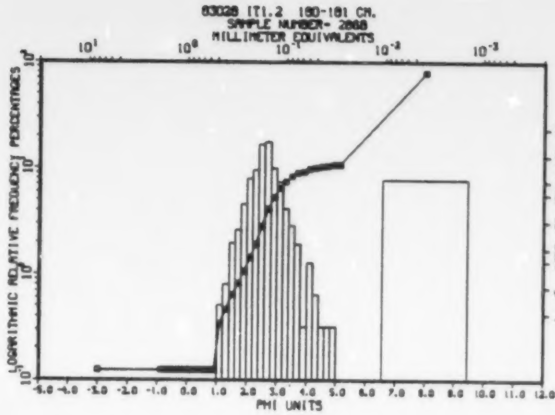

83028 IT1.2 13[illegible]-139 CM.
SAMPLE NUMBER- 2863

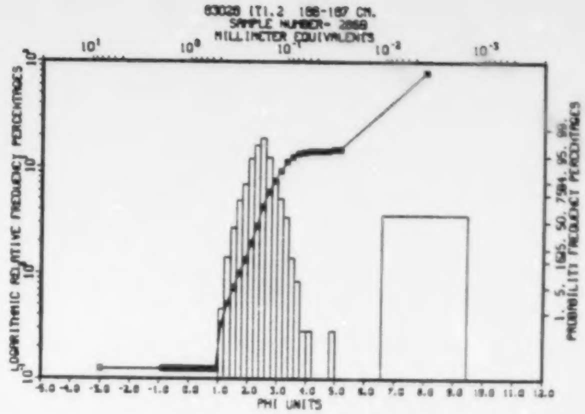

83028 IT1.2 140-141 CM.
SAMPLE NUMBER- 2864

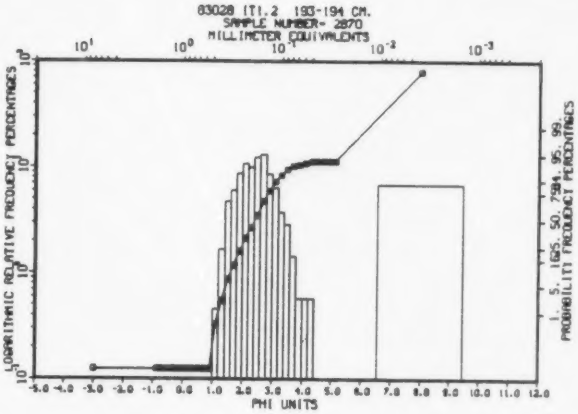

83028 IT1.2 160-161 CM.
SAMPLE NUMBER 2865

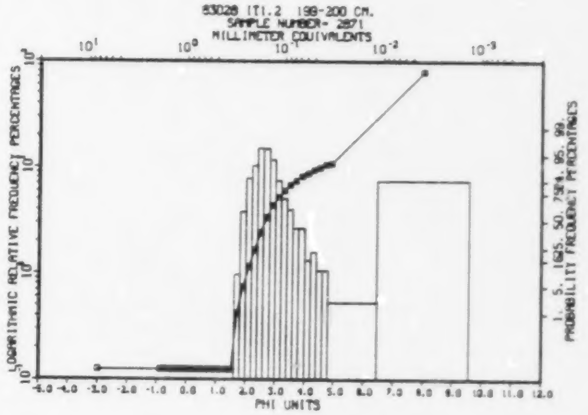

83028 IT1.2 170-171 CM.
SAMPLE NUMBER 2866

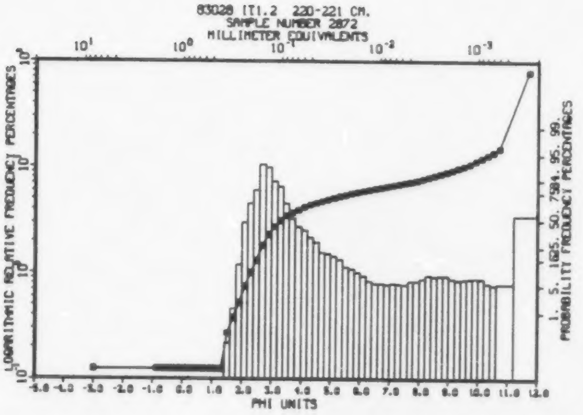

83028 IT1.2 173-174 CM.
SAMPLE NUMBER 2867

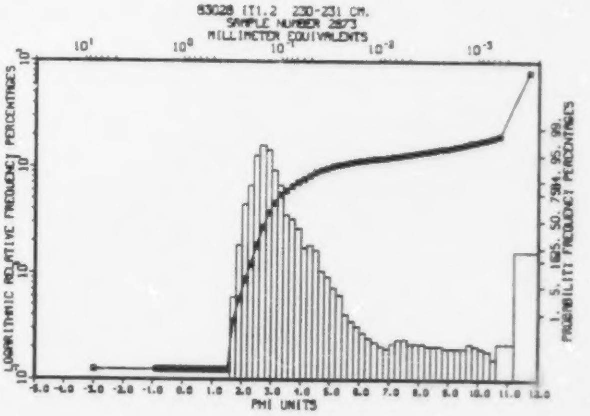

83028 IT1.2 180-181 CM.
SAMPLE NUMBER- 2868
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

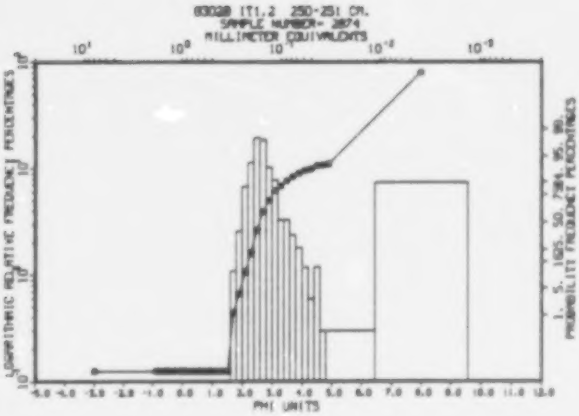

83028 IT1.2 186-187 CM.
SAMPLE NUMBER- 2869
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

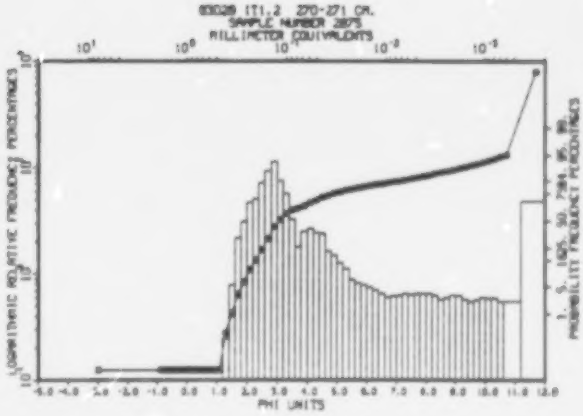

83028 IT1.2 193-194 CM.
SAMPLE NUMBER- 2870
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

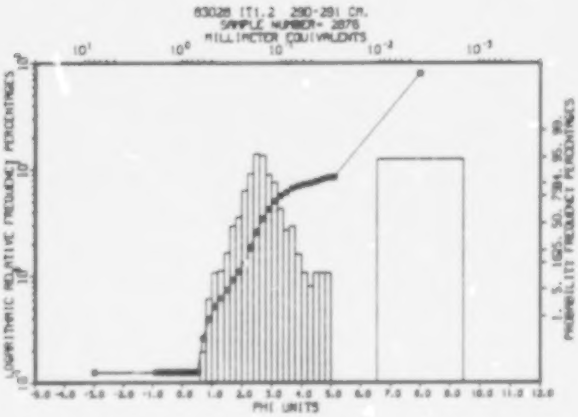

83028 IT1.2 199-200 CM.
SAMPLE NUMBER- 2871
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

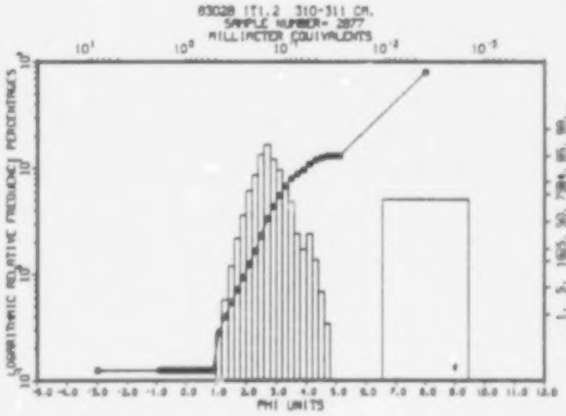

83028 IT1.2 220-221 CM.
SAMPLE NUMBER 2872
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

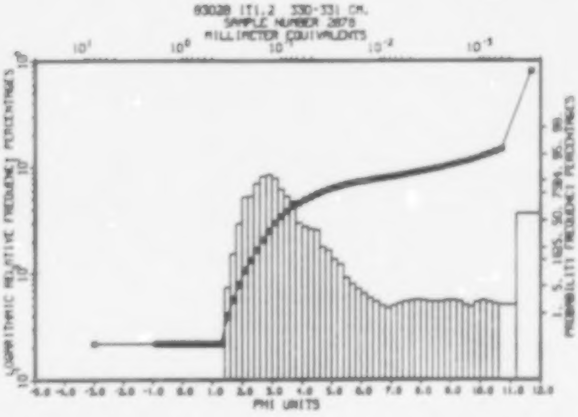

83028 IT1.2 230-231 CM.
SAMPLE NUMBER 2873
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

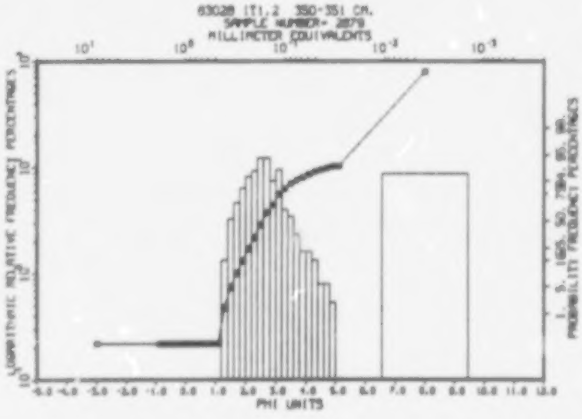

83028 IT1.2 250-251 CM.
SAMPLE NUMBER= 2874
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

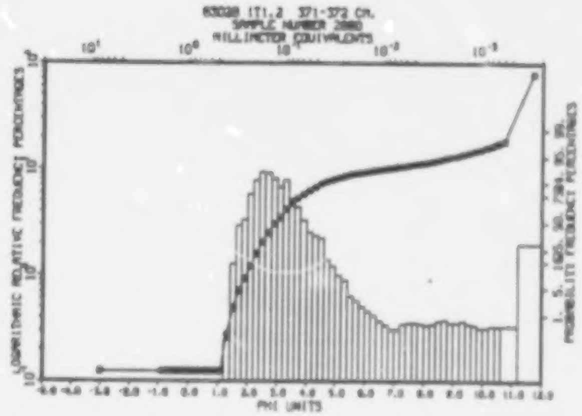

83028 IT1.2 270-271 CM.
SAMPLE NUMBER= 2875
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

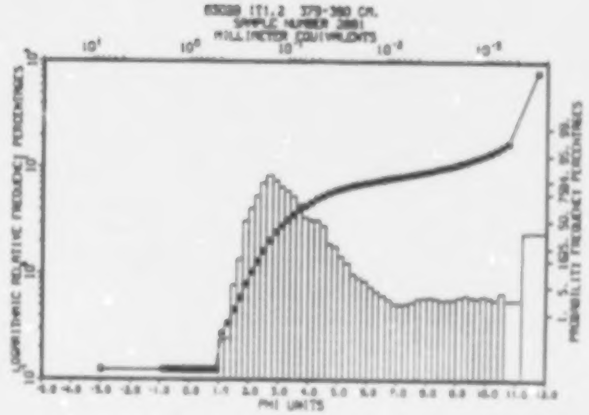

83028 IT1.2 290-291 CM.
SAMPLE NUMBER= 2876
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

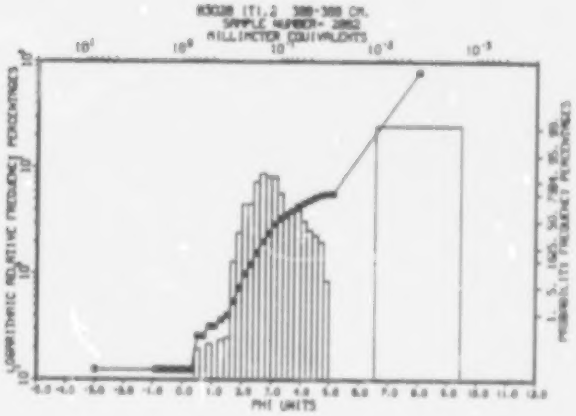

83028 IT1.2 310-311 CM.
SAMPLE NUMBER= 2877
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

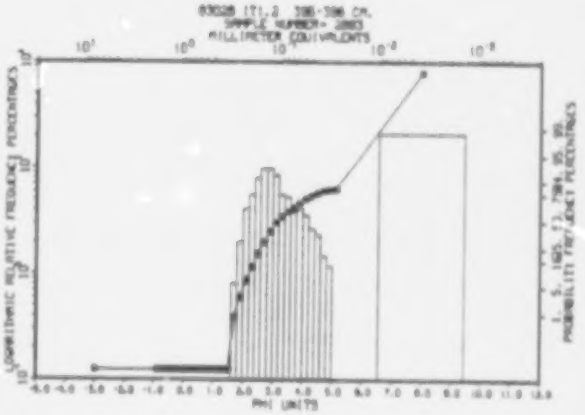

83028 IT1.2 330-331 CM.
SAMPLE NUMBER= 2878
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

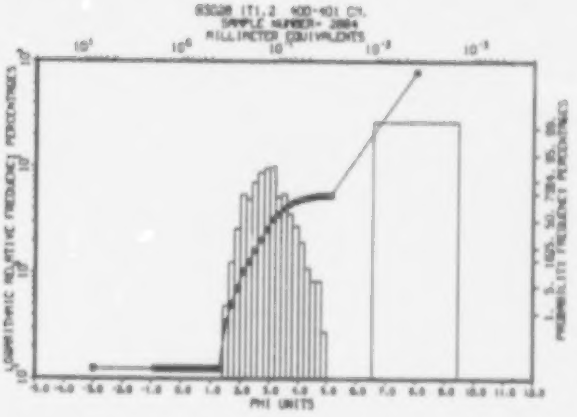

83028 IT1.2 350-351 CM.
SAMPLE NUMBER= 2879
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7384. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

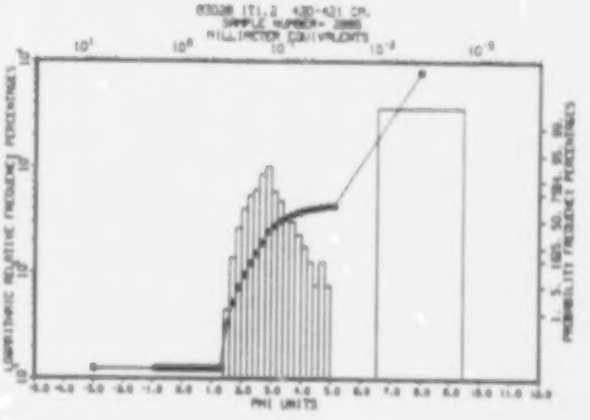

83028 IT1,2 371-372 CM.
SAMPLE NUMBER 2880
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

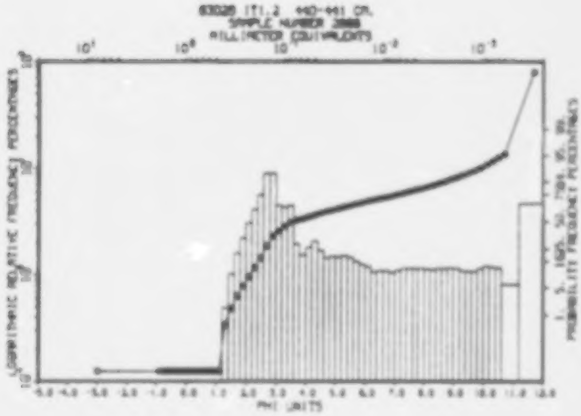

83028 IT1,2 379-380 CM.
SAMPLE NUMBER 2881
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

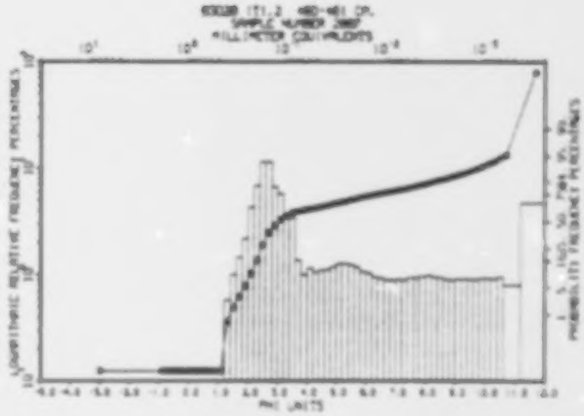

83028 IT1,2 388-389 CM.
SAMPLE NUMBER= 2882
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

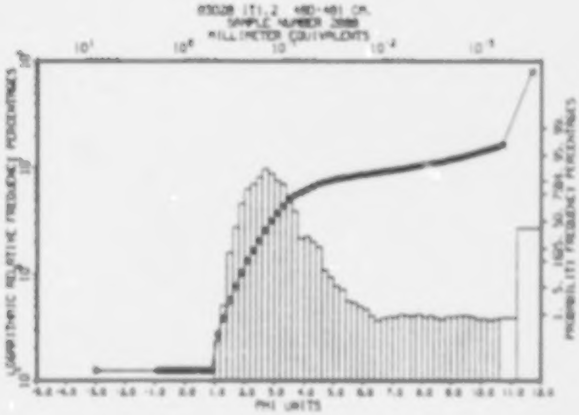

83028 IT1,2 398-399 CM.
SAMPLE NUMBER= 2883
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

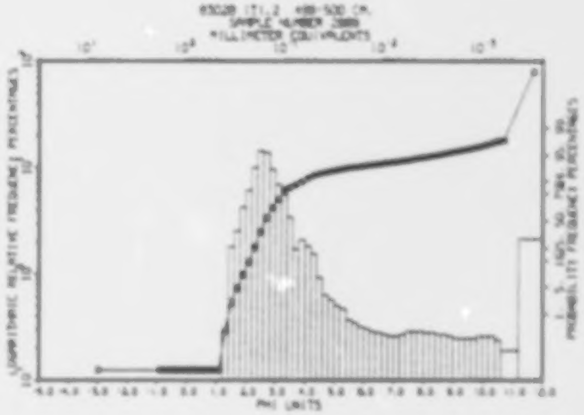

83028 IT1,2 400-401 CM.
SAMPLE NUMBER= 2884
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

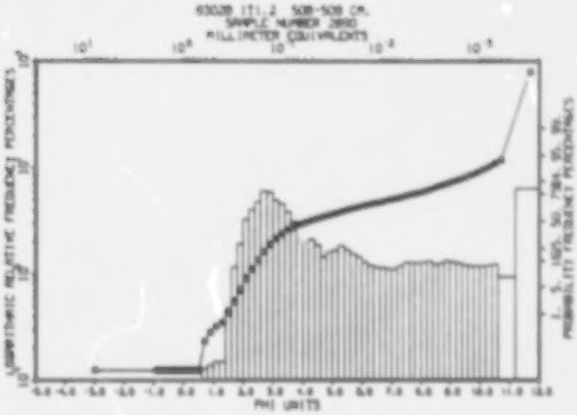

83028 IT1,2 420-421 CM.
SAMPLE NUMBER= 2885
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
PHI UNITS

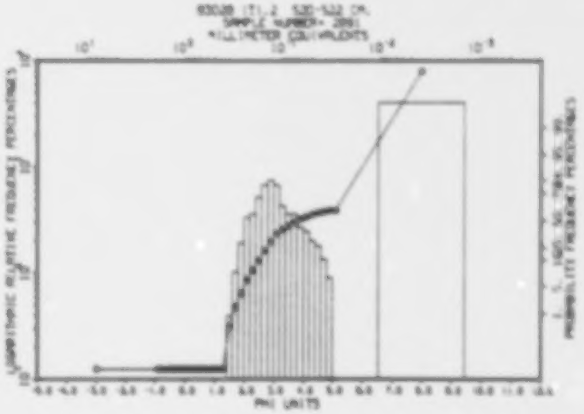

83028 (T1,2 440-441 CM.
SAMPLE NUMBER 2886
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16. 50. 84. 95. 99.
PHI UNITS

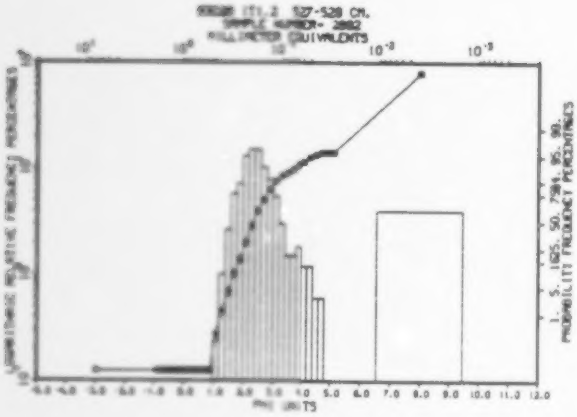

83028 (T1,2 460-461 CM.
SAMPLE NUMBER 2887
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16. 50. 84. 95. 99.
PHI UNITS

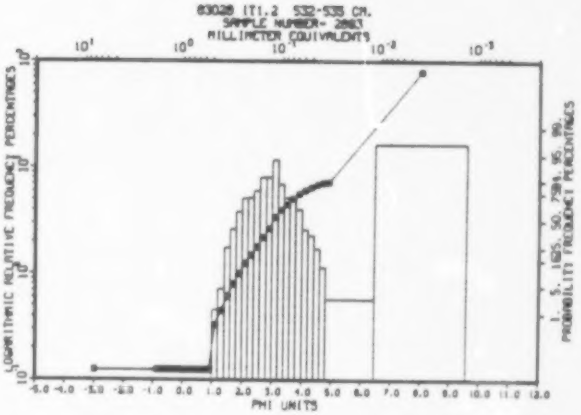

83028 (T1,2 480-481 CM.
SAMPLE NUMBER 2888
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16. 50. 84. 95. 99.
PHI UNITS

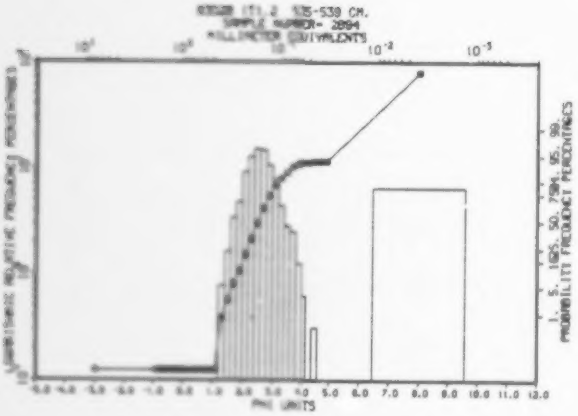

83028 (T1,2 498-500 CM.
SAMPLE NUMBER 2889
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16. 50. 84. 95. 99.
PHI UNITS

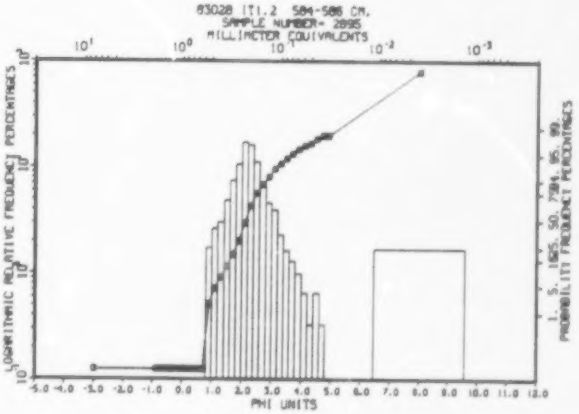

83028 (T1,2 508-509 CM.
SAMPLE NUMBER 2890
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16. 50. 84. 95. 99.
PHI UNITS

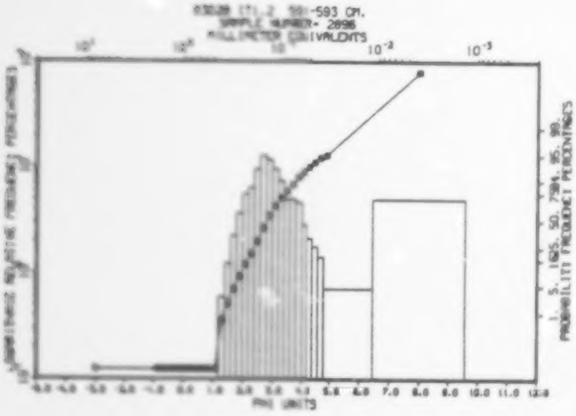

83028 (T1,2 520-522 CM.
SAMPLE NUMBER= 2891
MILLIMETER EQUIVALENTS
10¹ 10⁰ 10⁻¹ 10⁻² 10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 16. 50. 84. 95. 99.
PHI UNITS

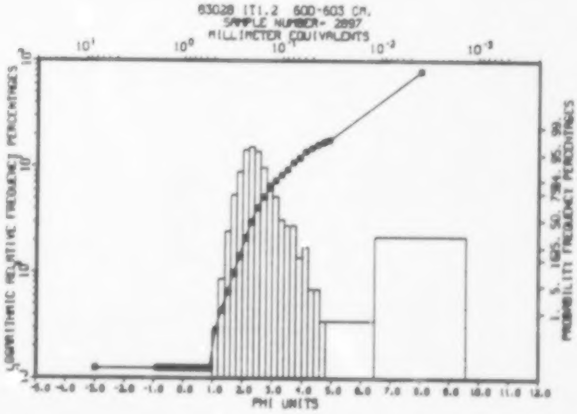

83028 IT1.2 527-528 CM.
SAMPLE NUMBER- 2892
MILLIMETER EQUIVALENTS
10^1
10^0
10^-1
10^-2
10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

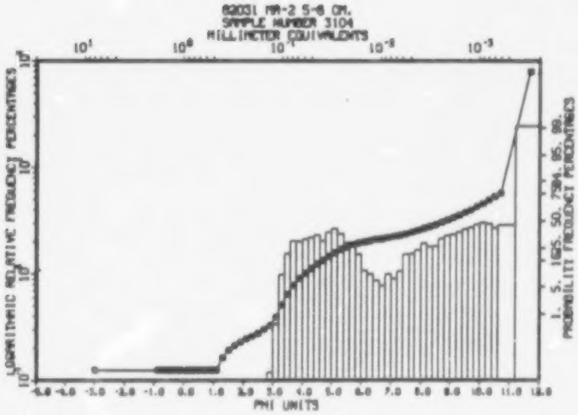

83028 IT1.2 532-535 CM.
SAMPLE NUMBER- 2893
MILLIMETER EQUIVALENTS
10^1
10^0
10^-1
10^-2
10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

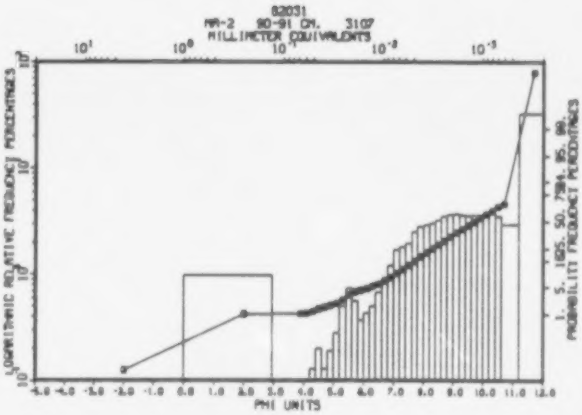

83028 IT1.2 535-539 CM.
SAMPLE NUMBER- 2894
MILLIMETER EQUIVALENTS
10^1
10^0
10^-1
10^-2
10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

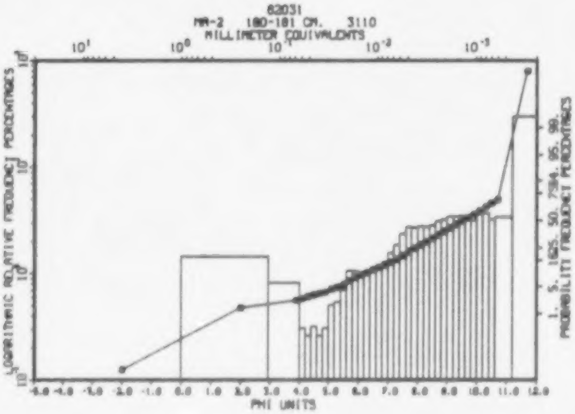

83028 IT1.2 584-586 CM.
SAMPLE NUMBER- 2895
MILLIMETER EQUIVALENTS
10^1
10^0
10^-1
10^-2
10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

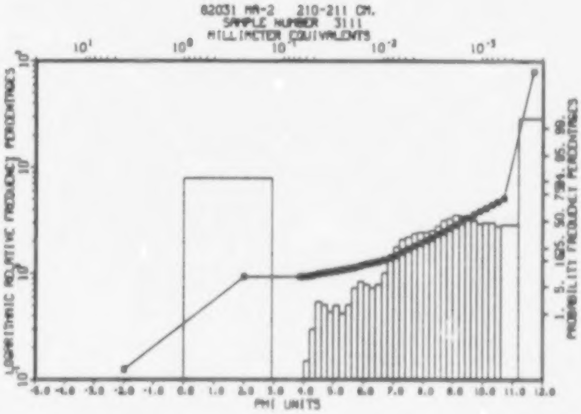

83028 IT1.2 591-593 CM.
SAMPLE NUMBER- 2896
MILLIMETER EQUIVALENTS
10^1
10^0
10^-1
10^-2
10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

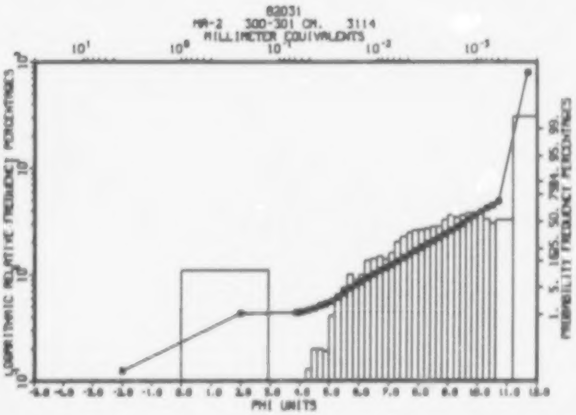

83028 IT1.2 600-603 CM.
SAMPLE NUMBER- 2897
MILLIMETER EQUIVALENTS
10^1
10^0
10^-1
10^-2
10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

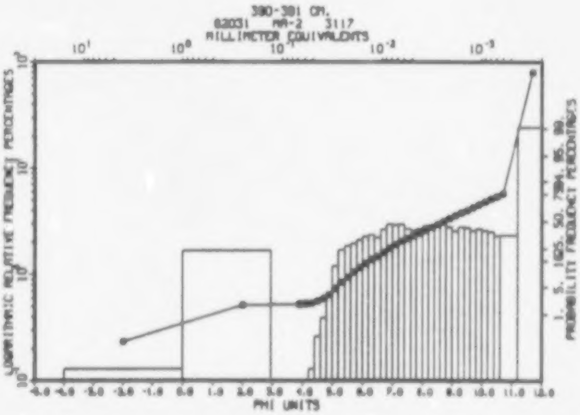

82031 MA-2 5-6 CM.
SAMPLE NUMBER 3104
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

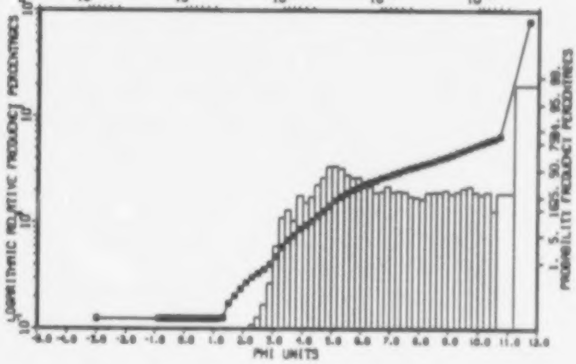

82031
MA-2 90-91 CM. 3107
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


82031
MA-2 180-181 CM. 3110
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

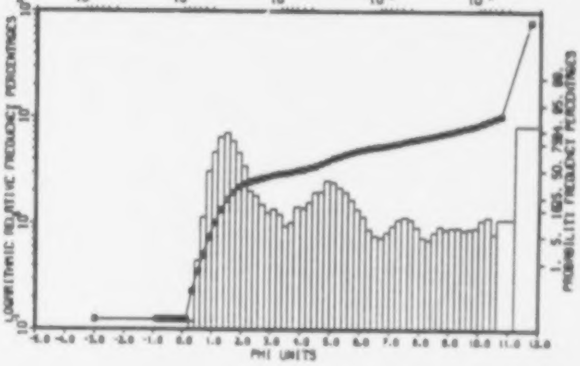

82031 MA-2 210-211 CM.
SAMPLE NUMBER 3111
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


82031
MA-2 300-301 CM. 3114
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

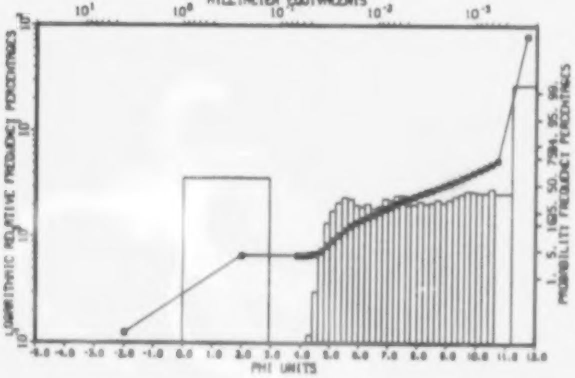

390-391 CM.
82031 MA-2 3117
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS



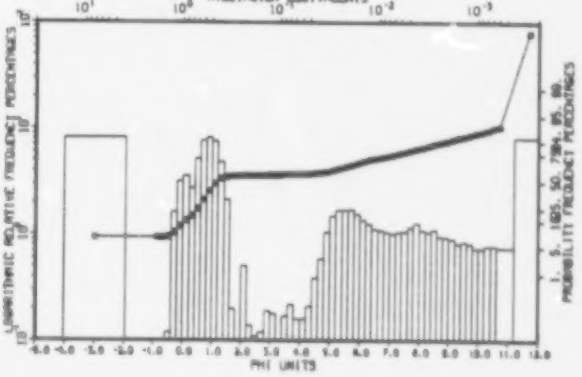
82031 MA-2 492.5-493.5 CM.
SAMPLE NUMBER 3120



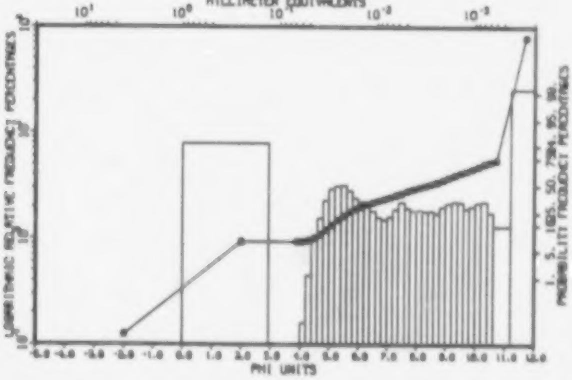
82031 MA-2 494-494.5 CM.
SAMPLE NUMBER 3121



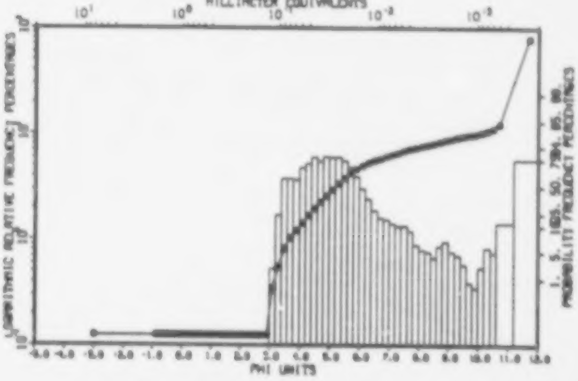
82031
MA-2 528-529 CM. 3122



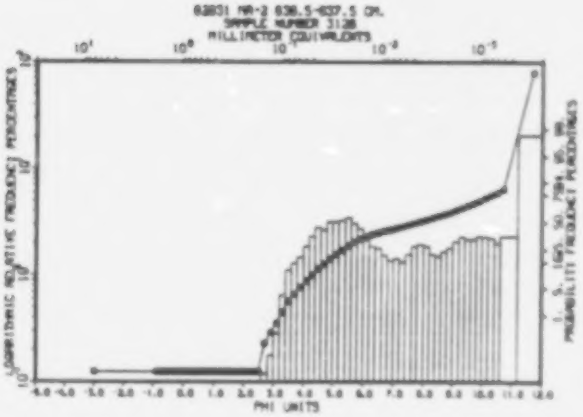
82031 MA-2 529-530 CM.
SAMPLE NUMBER 3123

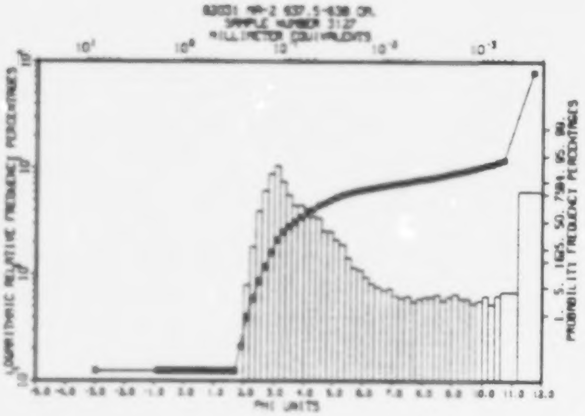


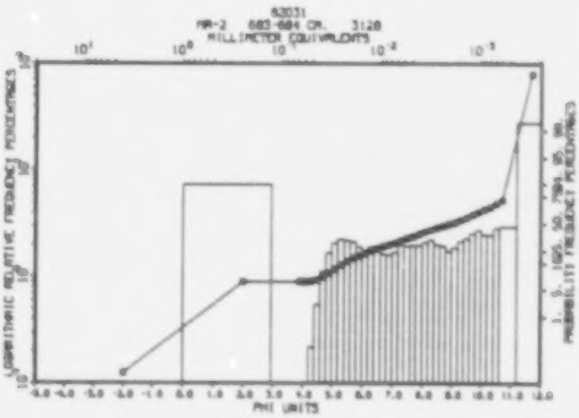
82031
MA-2 615-616 CM. 3124

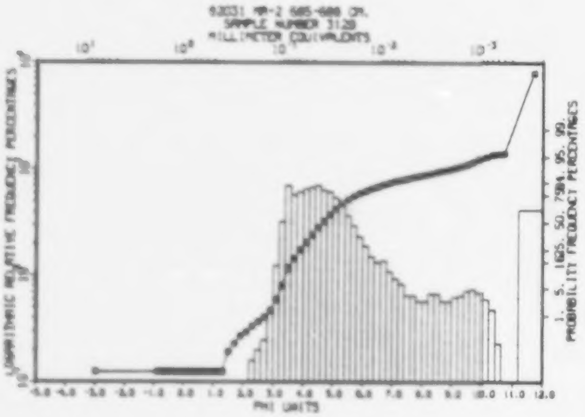


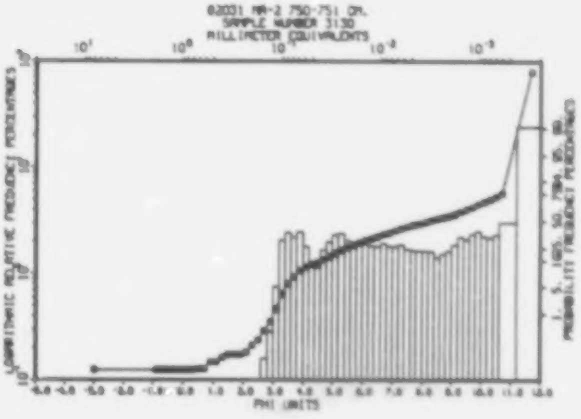
82031 MA-2 616-617 CM.
SAMPLE NUMBER 3125

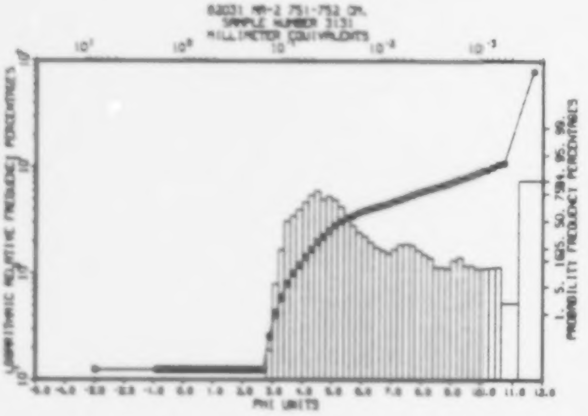

82031 MR-2 636.5-637.5 CM.
SAMPLE NUMBER 3126
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS


82031 MR-2 637.5-638 CM.
SAMPLE NUMBER 3127
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS

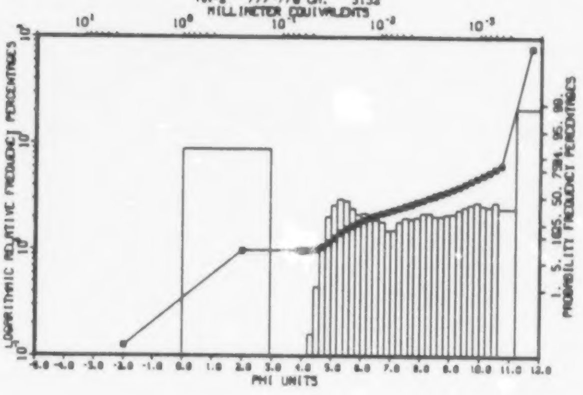

82031
MR-2 683-684 CM. 3128
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS


82031 MR-2 685-686 CM.
SAMPLE NUMBER 3129
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS

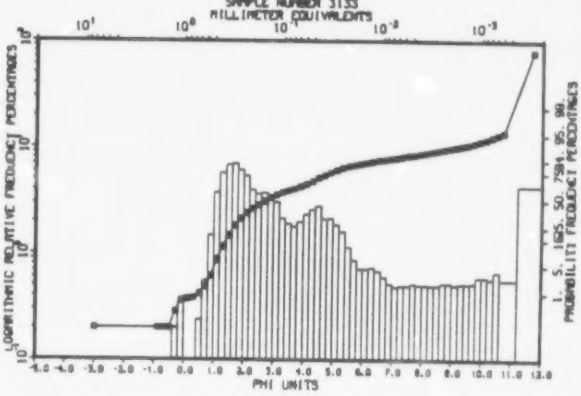

82031 MR-2 750-751 CM.
SAMPLE NUMBER 3130
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS


82031 MR-2 751-752 CM.
SAMPLE NUMBER 3131
MILLIMETER EQUIVALENTS
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
PHI UNITS

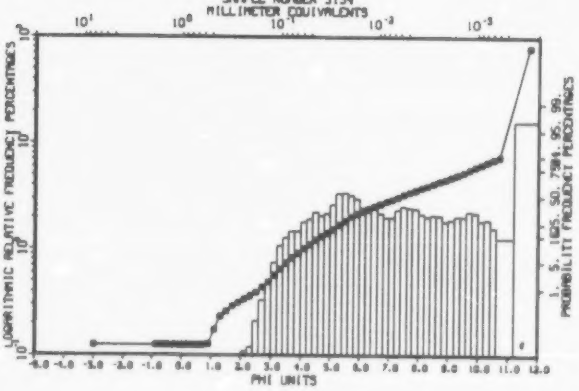
82031
MA-2 777-778 CM. 3132



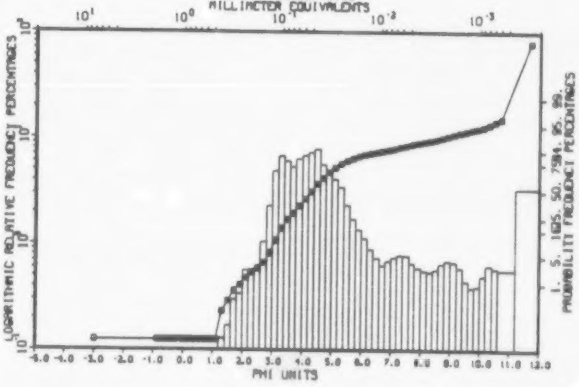
82031 MA-2 779-780 CM.
SAMPLE NUMBER 3133



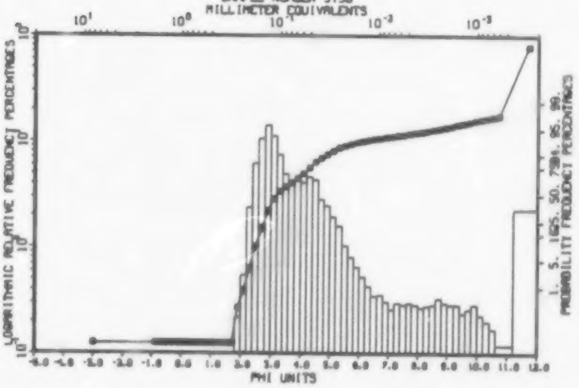
82031 MA-2 827-828 CM.
SAMPLE NUMBER 3134



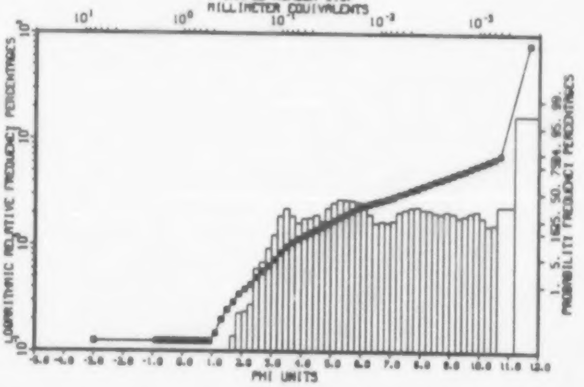
82031 MA-2 828-829 CM.
SAMPLE NUMBER 3135

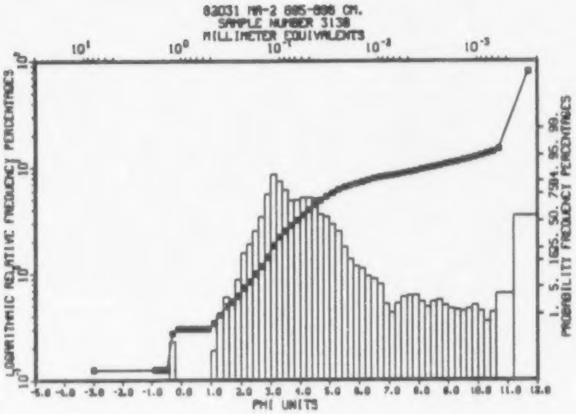


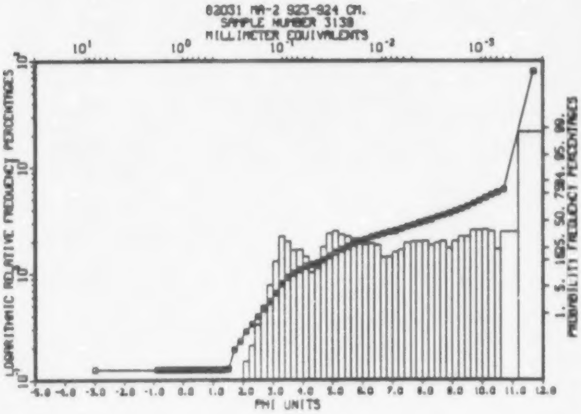
82031 MA-2 834-835 CM.
SAMPLE NUMBER 3136

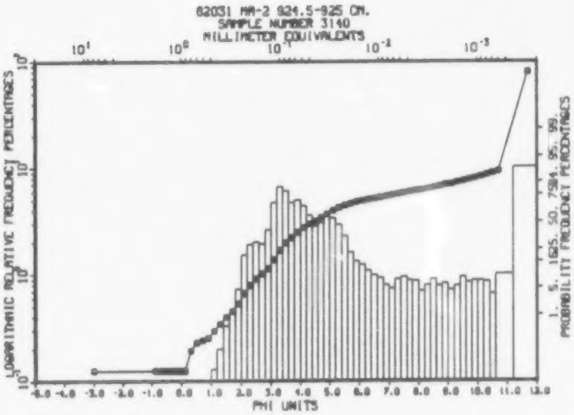


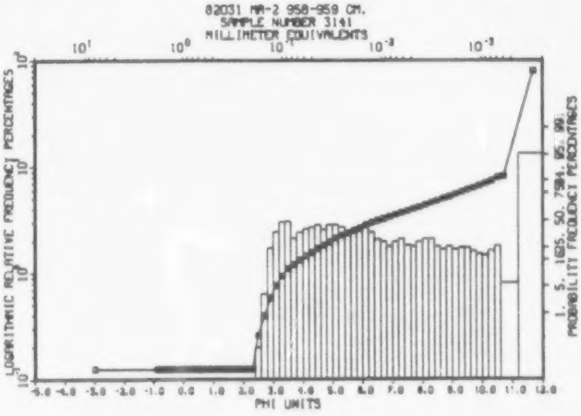
82031 MA-2 882-883 CM.
SAMPLE NUMBER 3137

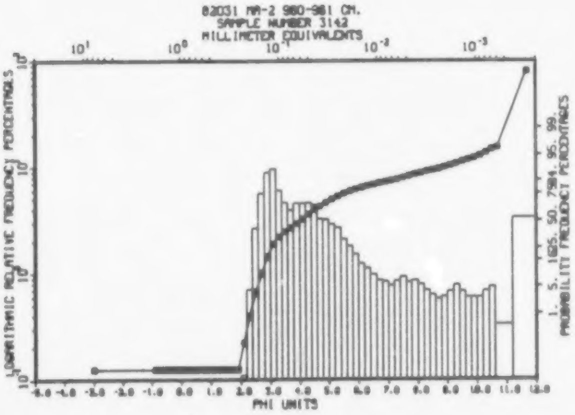


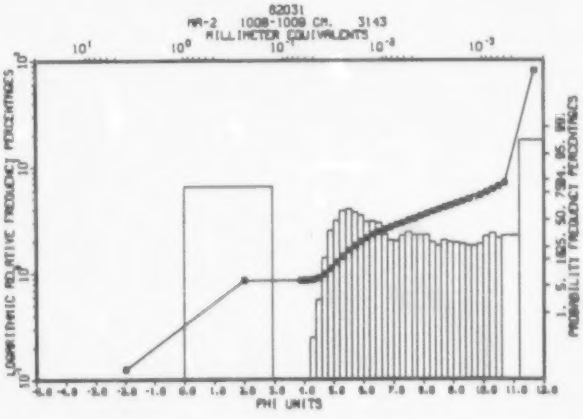

82031 MA-2 885-886 CM.
SAMPLE NUMBER 3138
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2 10^1 10^0 10^-1
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

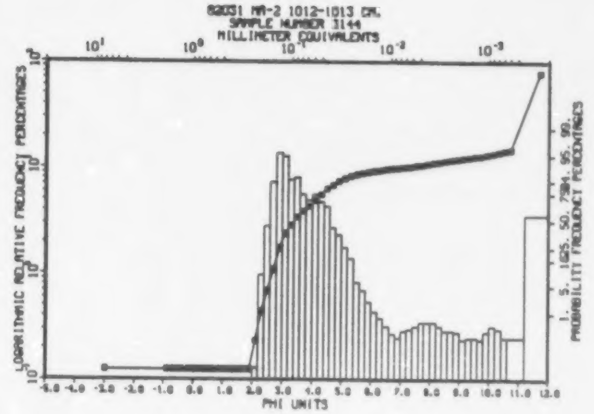

82031 MA-2 923-924 CM.
SAMPLE NUMBER 3139
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2 10^1 10^0 10^-1
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

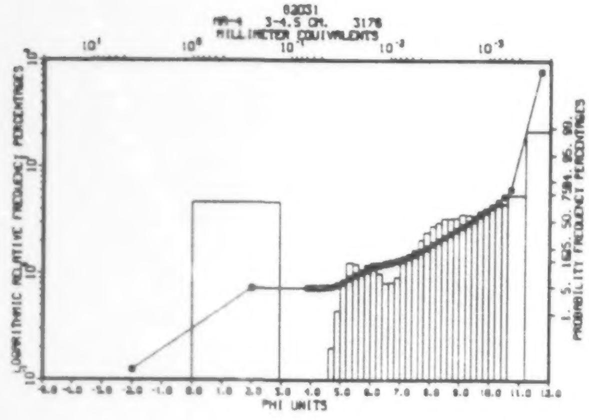

82031 MA-2 924.5-925 CM.
SAMPLE NUMBER 3140
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2 10^1 10^0 10^-1
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

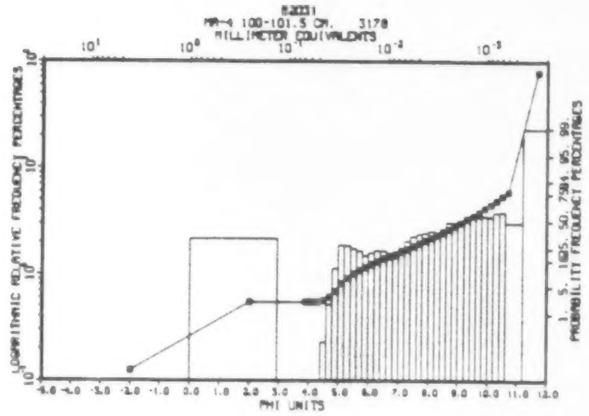

82031 MA-2 958-959 CM.
SAMPLE NUMBER 3141
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2 10^1 10^0 10^-1
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

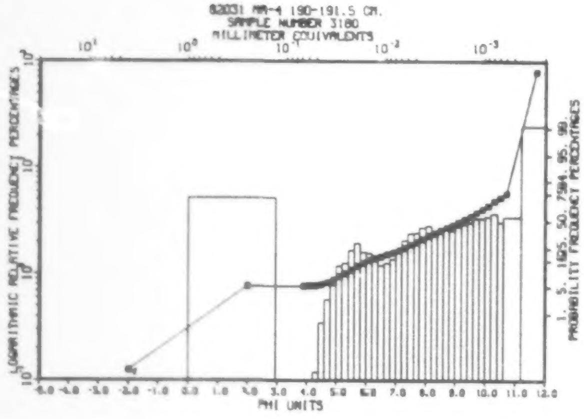

82031 MA-2 980-981 CM.
SAMPLE NUMBER 3142
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2 10^1 10^0 10^-1
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

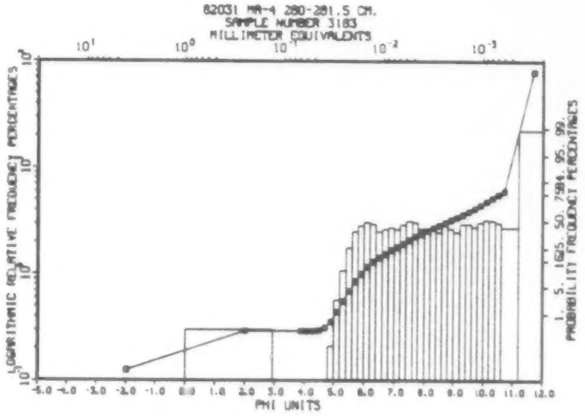

82031
MA-2 1008-1009 CM. 3143
MILLIMETER EQUIVALENTS
10^1 10^0 10^-1 10^-2 10^-3
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^2 10^1 10^0 10^-1
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

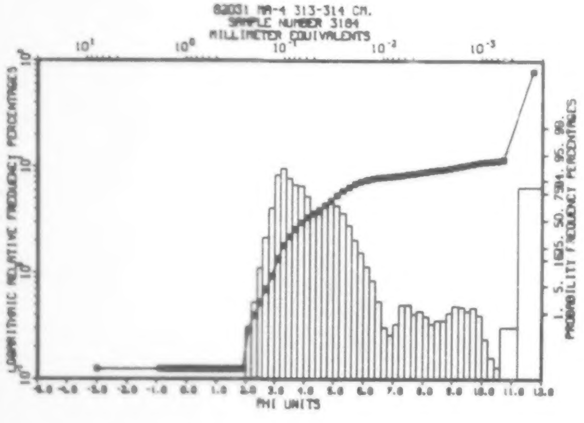

82031 MA-2 1012-1013 CM.
SAMPLE NUMBER 3144
MILLIMETER EQUIVALENTS
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^{2}
10^{1}
10^{0}
10^{-1}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

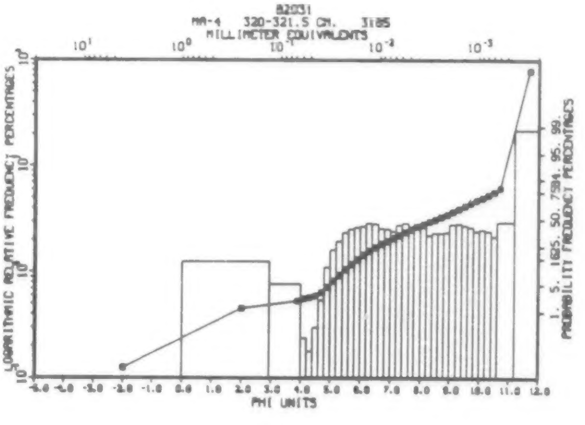

82031
MA-4 3-4.5 CM. 3178
MILLIMETER EQUIVALENTS
10^{1} 10^{0} 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^{-1} 10^{0} 10^{1} 10^{2}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


82031
MA-4 100-101.5 CM. 3179
MILLIMETER EQUIVALENTS
10^{1} 10^{0} 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^{-1} 10^{0} 10^{1} 10^{2}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

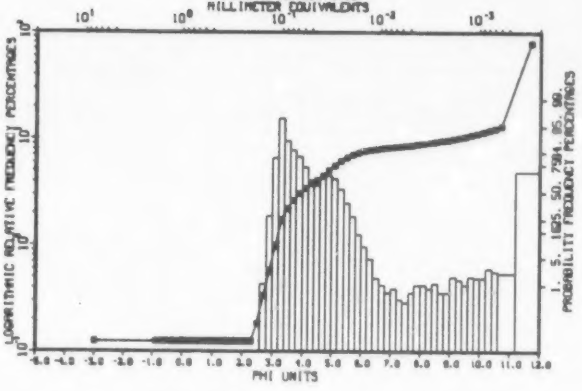

82031 MA-4 190-191.5 CM.
SAMPLE NUMBER 3180
MILLIMETER EQUIVALENTS
10^{1} 10^{0} 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^{-1} 10^{0} 10^{1} 10^{2}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


82031 MA-4 280-281.5 CM.
SAMPLE NUMBER 3183
MILLIMETER EQUIVALENTS
10^{1} 10^{0} 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^{-1} 10^{0} 10^{1} 10^{2}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

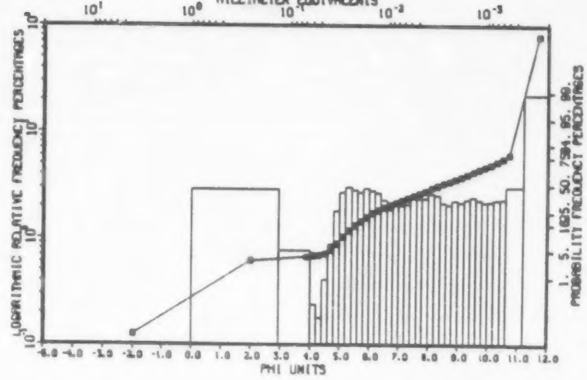

82031 MA-4 313-314 CM.
SAMPLE NUMBER 3184
MILLIMETER EQUIVALENTS
10^{1} 10^{0} 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^{-1} 10^{0} 10^{1} 10^{2}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS


82031
MA-4 320-321.5 CM. 3185
MILLIMETER EQUIVALENTS
10^{1} 10^{0} 10^{-1} 10^{-2} 10^{-3}
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10^{-1} 10^{0} 10^{1} 10^{2}
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1625. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

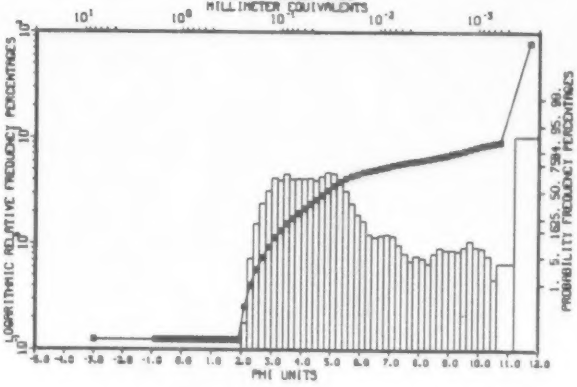
82031 MA-4 351-352 CM.
SAMPLE NUMBER 3186
MILLIMETER EQUIVALENTS



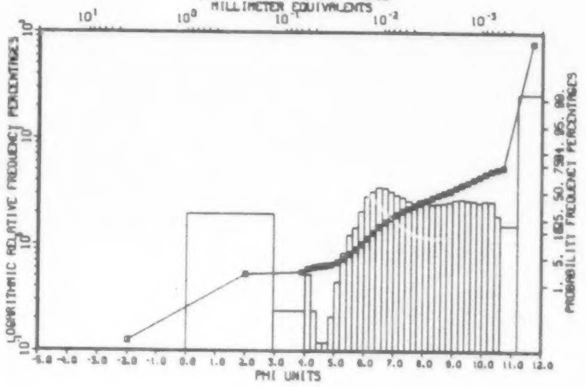
82031
MA-4 380-381.5 CM. 3188
MILLIMETER EQUIVALENTS



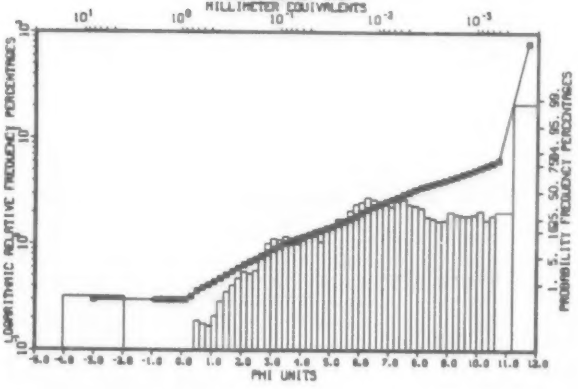
82031 MA-4 407-409 CM.
SAMPLE NUMBER 3189
MILLIMETER EQUIVALENTS



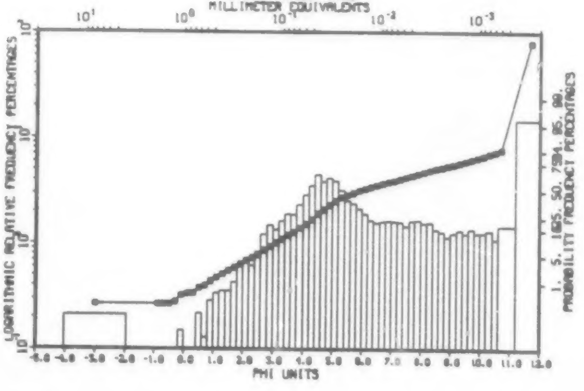
82031
MA-4 410-411.5 CM. 3190
MILLIMETER EQUIVALENTS



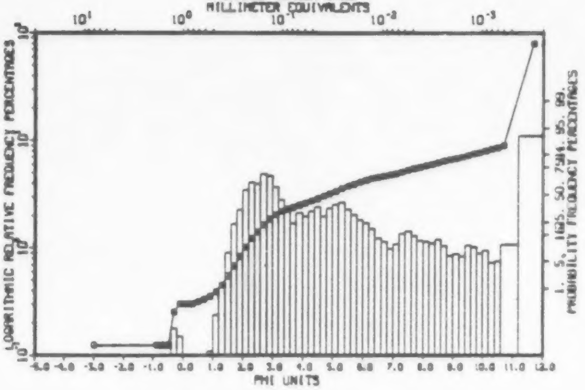
82031 MA-4 450-451.5 CM.
SAMPLE NUMBER 3191
MILLIMETER EQUIVALENTS



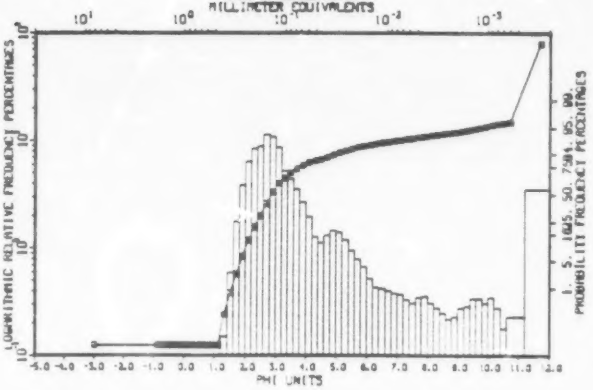
82031 MA-4 470-471.5 CM.
SAMPLE NUMBER 3192
MILLIMETER EQUIVALENTS



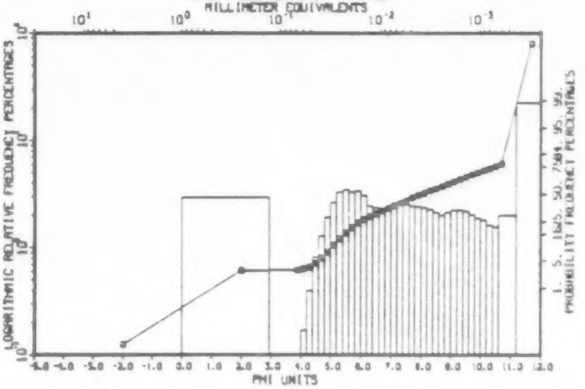
82031 MA-4 490-491.5 CM.
SAMPLE NUMBER 3193



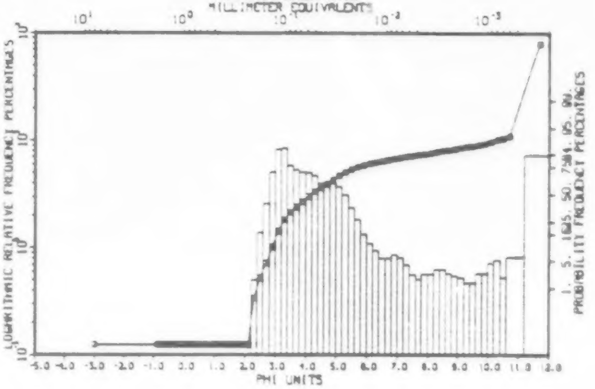
82031 MA-4 538-539 CM.
SAMPLE NUMBER 3194



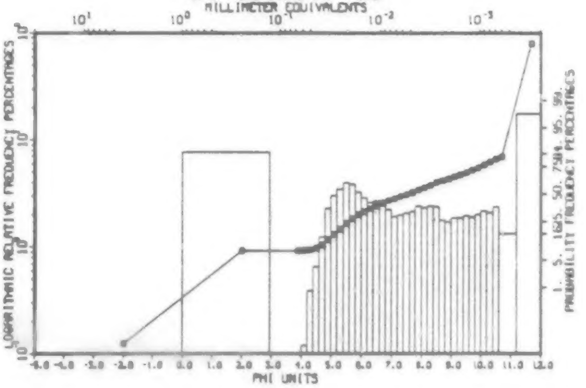
82031
MA-4 580-581.5 CM. 3195



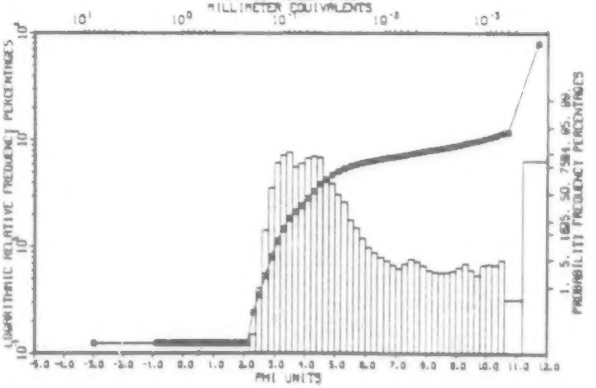
82031 MA-4 600-601 CM.
SAMPLE NUMBER 3196



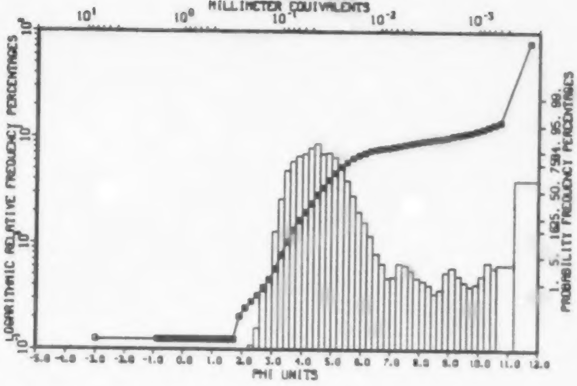
82031
MA-4 640-641.5 CM. 3197



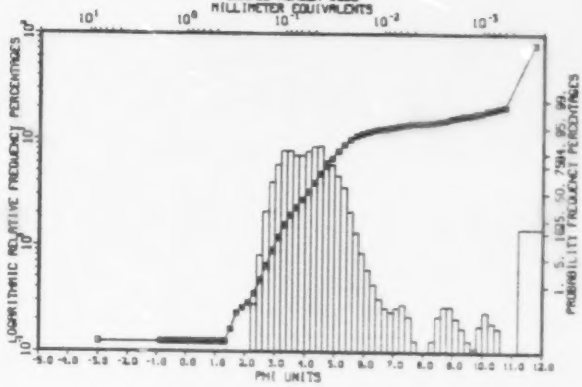
82031 MA-4 652-653 CM.
SAMPLE NUMBER 3198



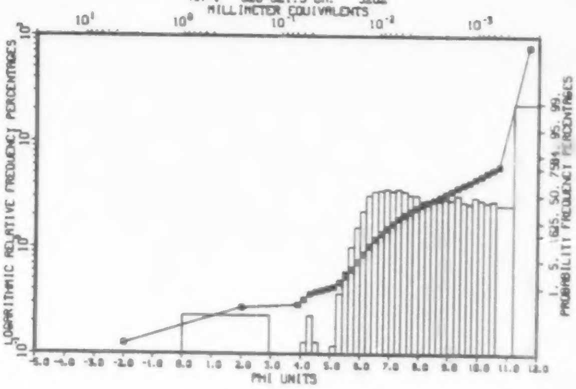
82031 MR-4 670-671 CM.
SAMPLE NUMBER 3198



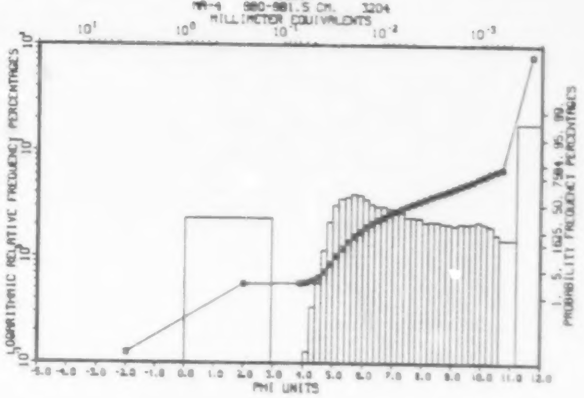
82031 MR-4 673-674 CM.
SAMPLE NUMBER 3200



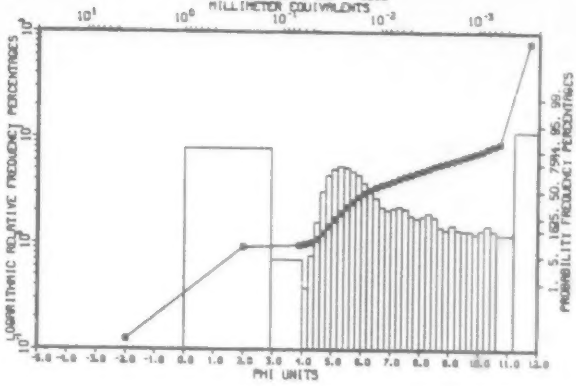
82031
MR-4 820-821.5 CM. 3202



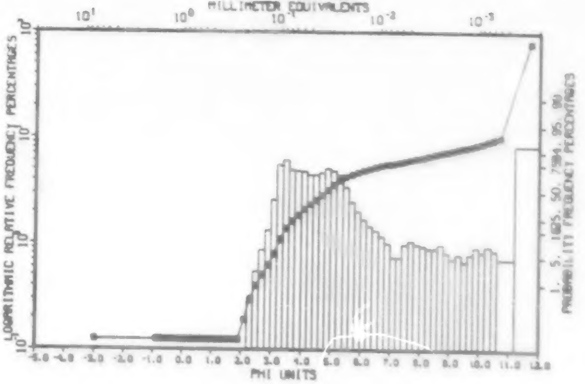
82031
MR-4 980-981.5 CM. 3204

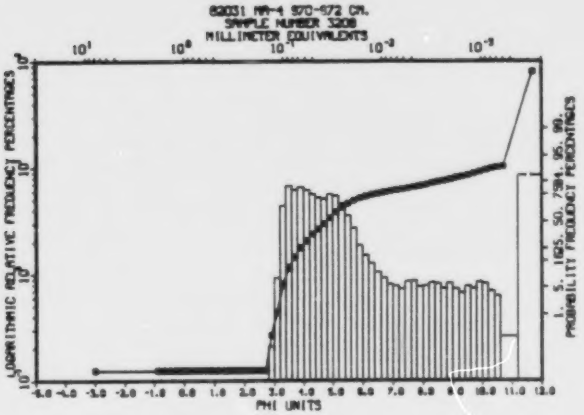


82031
MR-4 960-961.5 CM. 3206



82031 MR-4 967-968 CM.
SAMPLE NUMBER 3207




82031 MA-4 970-972 CM.
SAMPLE NUMBER 3208
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10⁰
10¹
10²
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

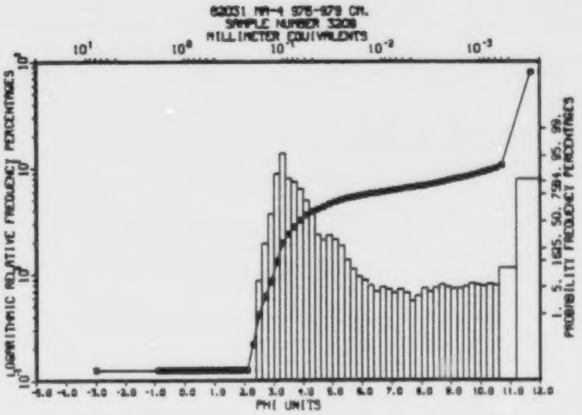
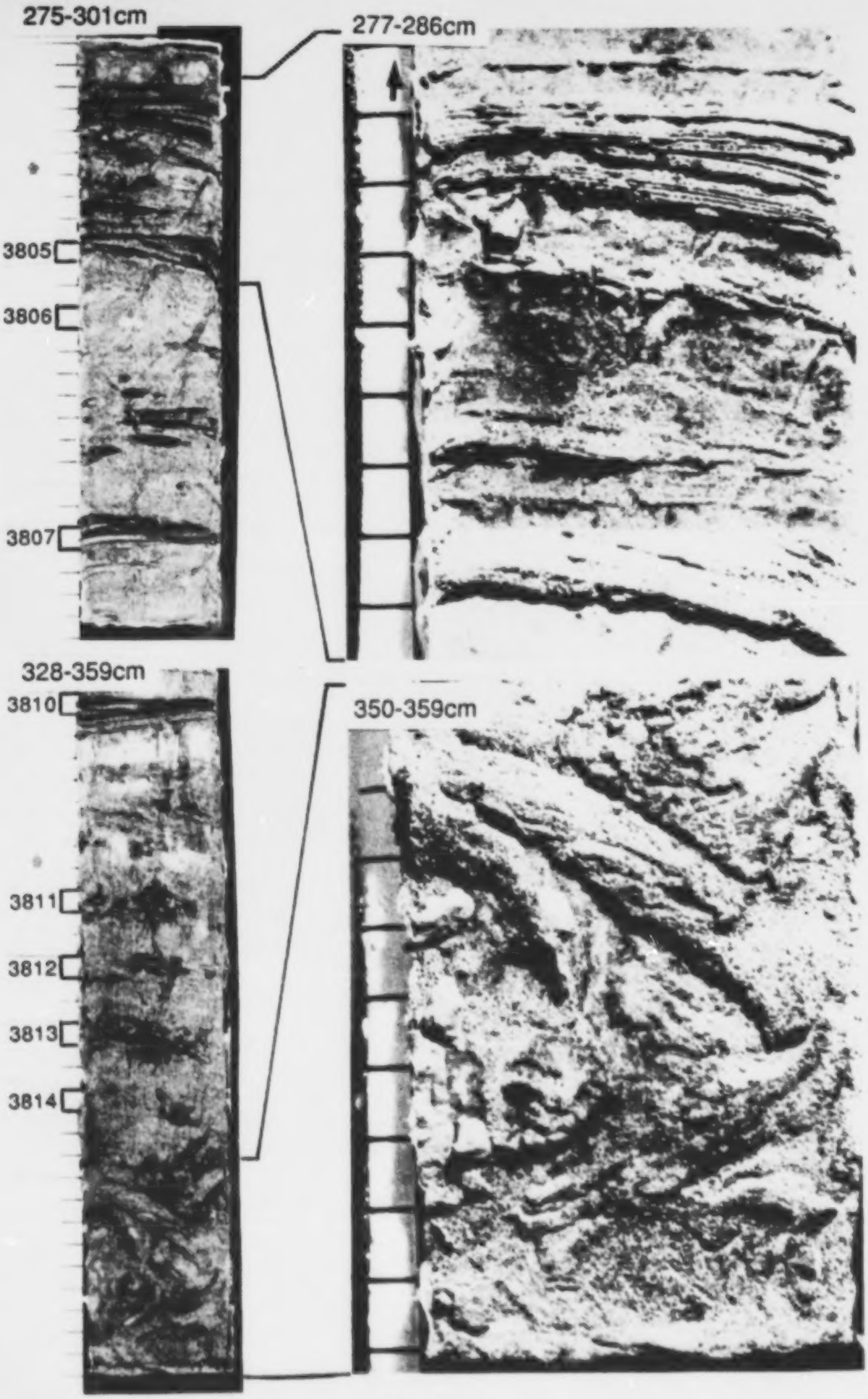
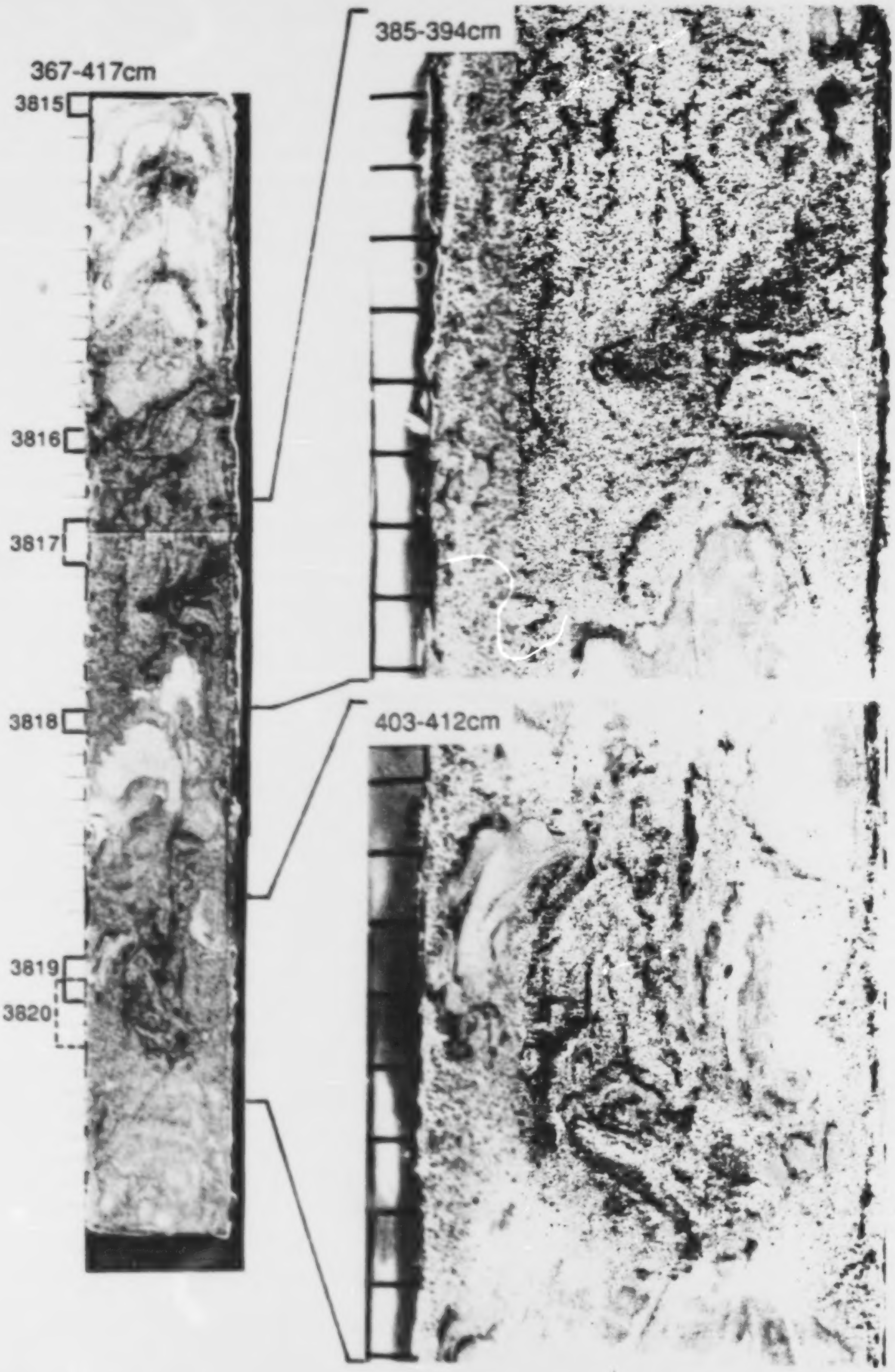

82031 MA-4 978-979 CM.
SAMPLE NUMBER 3208
MILLIMETER EQUIVALENTS
10¹
10⁰
10⁻¹
10⁻²
10⁻³
LOGARITHMIC RELATIVE FREQUENCY PERCENTAGES
10⁰
10¹
10²
PROBABILITY FREQUENCY PERCENTAGES
1. 5. 1025. 50. 7584. 95. 99.
-5.0 -4.0 -3.0 -2.0 -1.0 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0
PHI UNITS

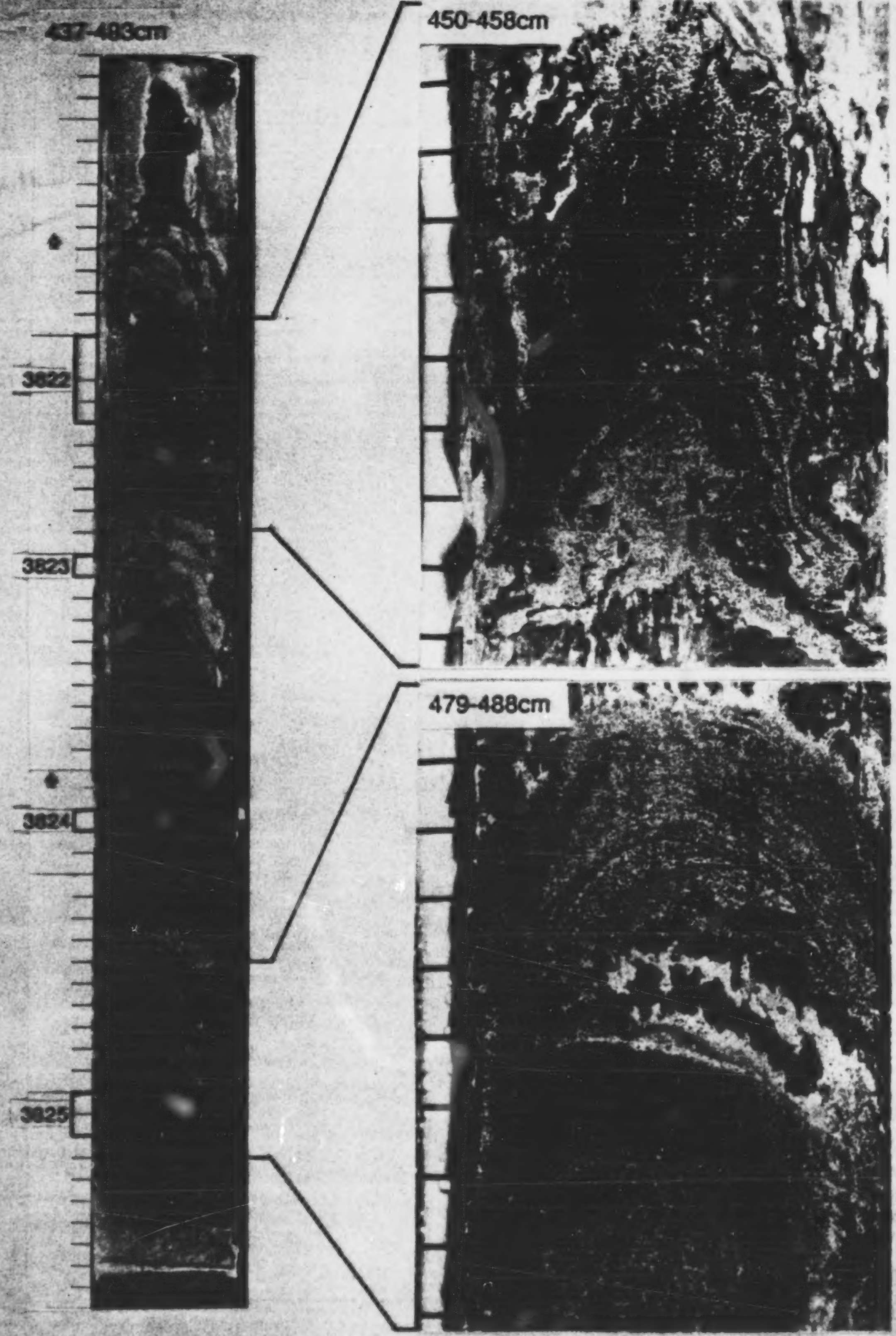
FIGURE 2 - Epoxy resin penetration peels of selected intervals of piston cores from Table 1. Sandy intervals appear granular and/or show sedimentary structures, while adjacent areas of bare epoxy (= no penetration in muddy sediments) appear mottled, contorted or striated. The locations of grain size subsamples (Table2, Figure 1) are indicated.


275-301cm
277-286cm
3805
3806
3807
328-359cm
3810
350-359cm
3811
3812
3813
3814

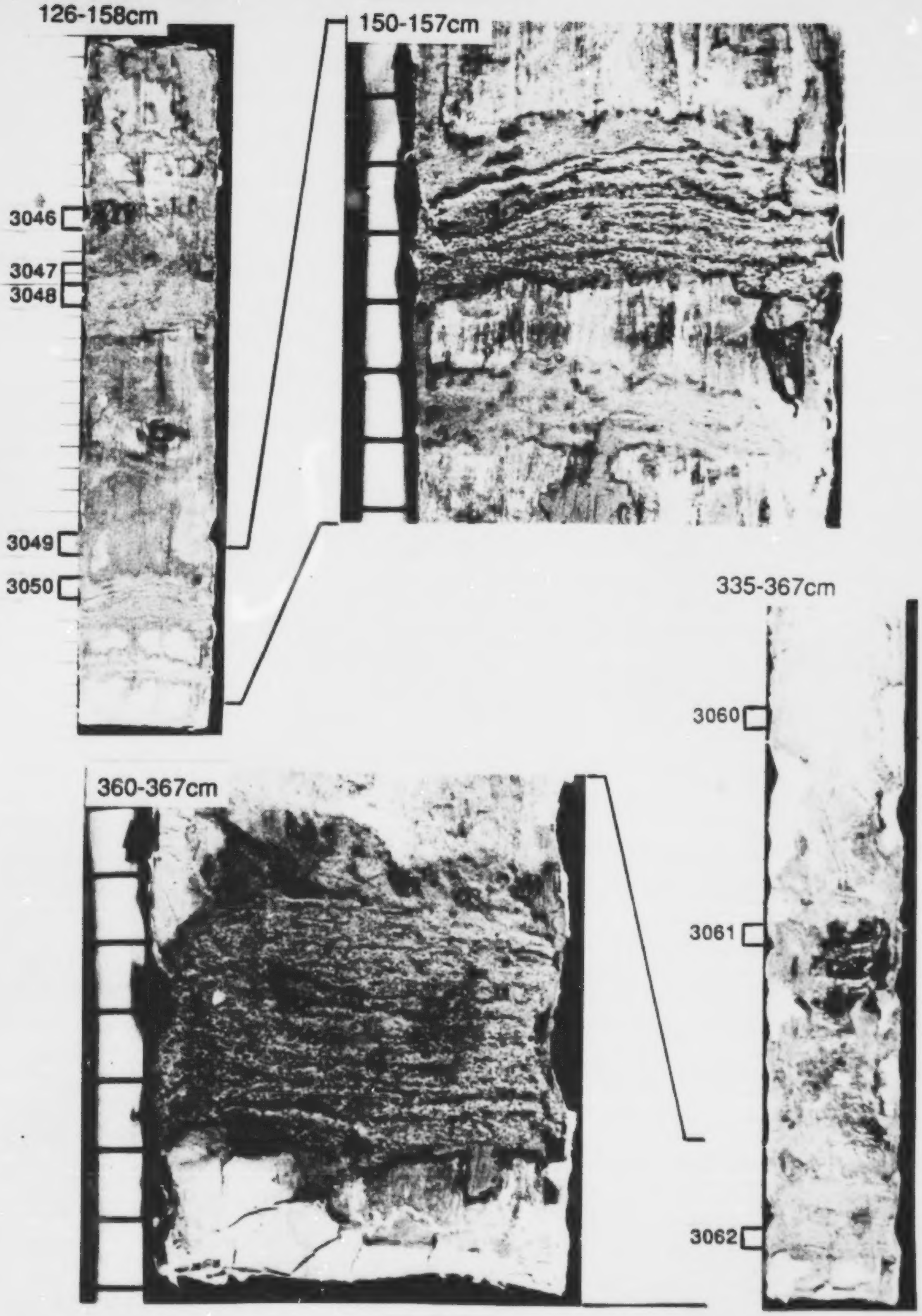
CA1.2


367-417cm
3815
3816
3817
3818
3819
3820
385-394cm
403-412cm

CA1.2


437-483cm
450-458cm
479-488cm
3822
3823
3824
3825

CA1.2


126-158cm
150-157cm
3046
3047
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3049
3050
335-367cm
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360-367cm
3061
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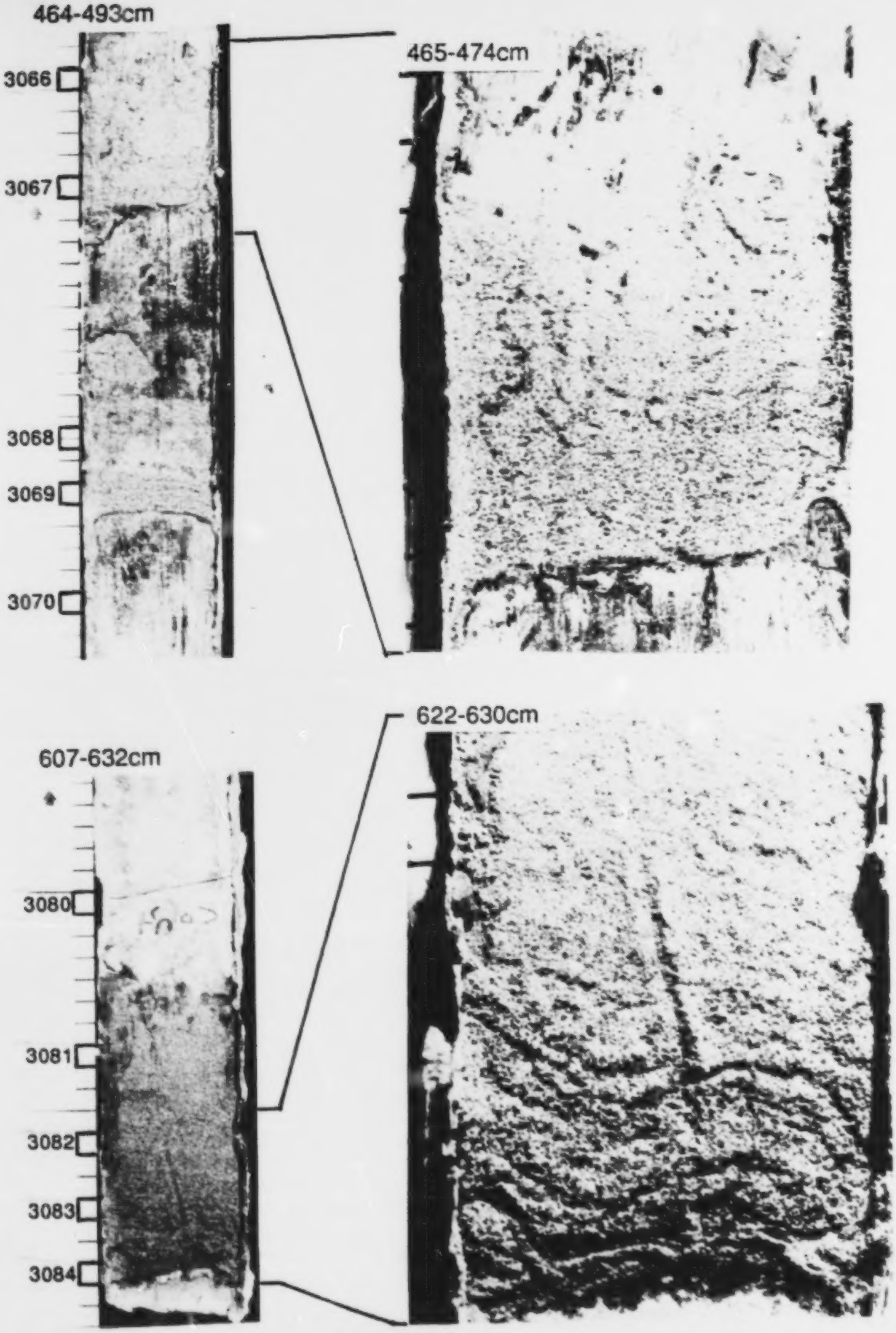
CO-2


464-493cm
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3067
3068
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465-474cm
622-630cm
607-632cm
3080
3081
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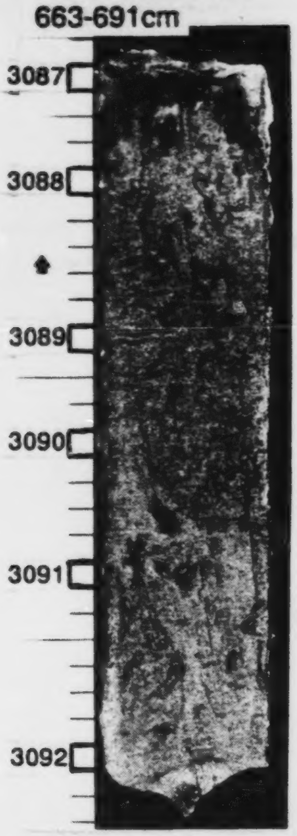
3083
3084

CO-2

663-691cm


3087
3088
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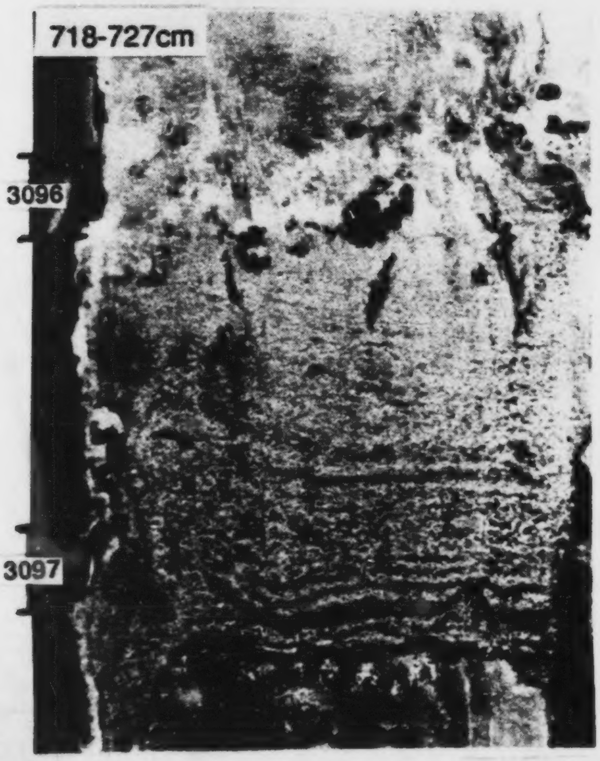
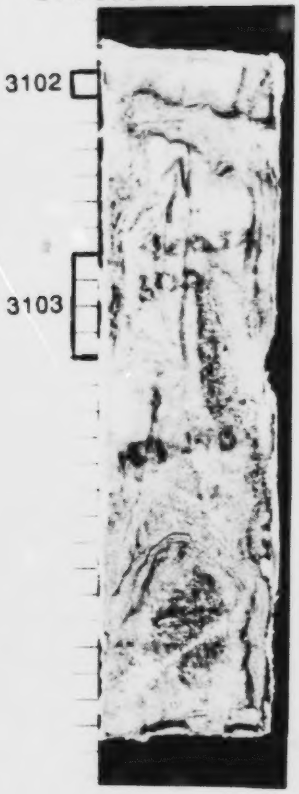
3090
3091
3092

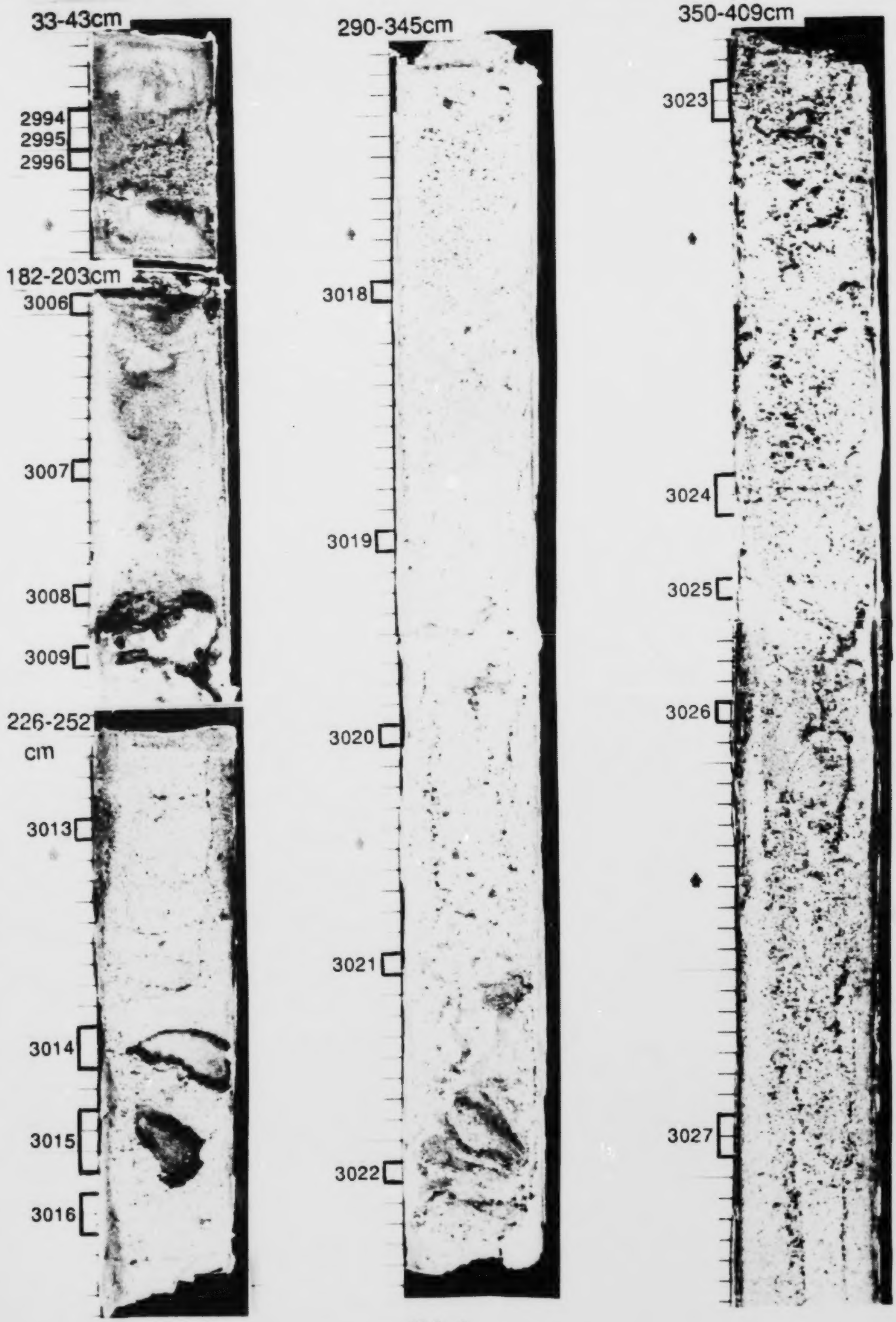
718-727cm



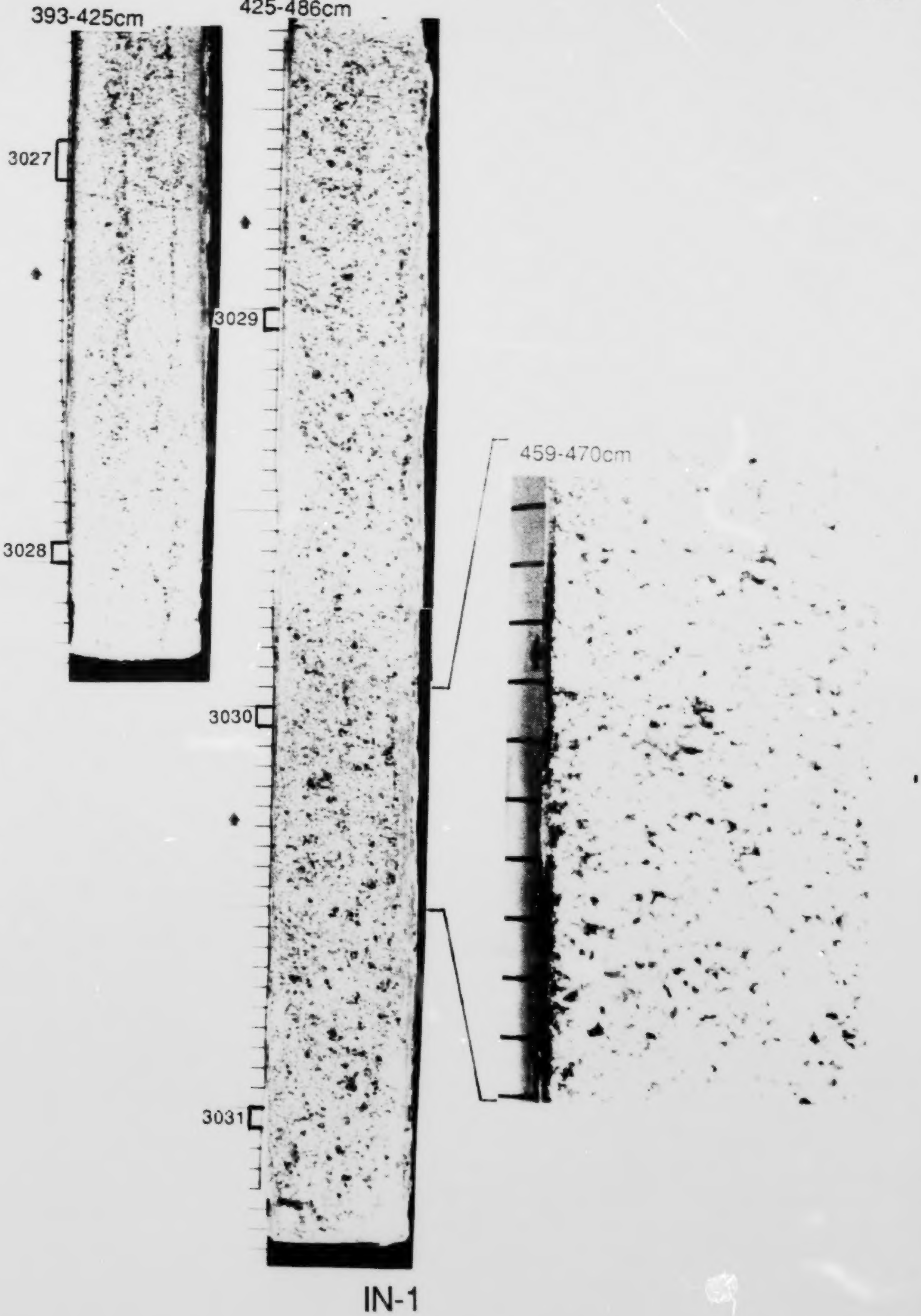
814-839cm



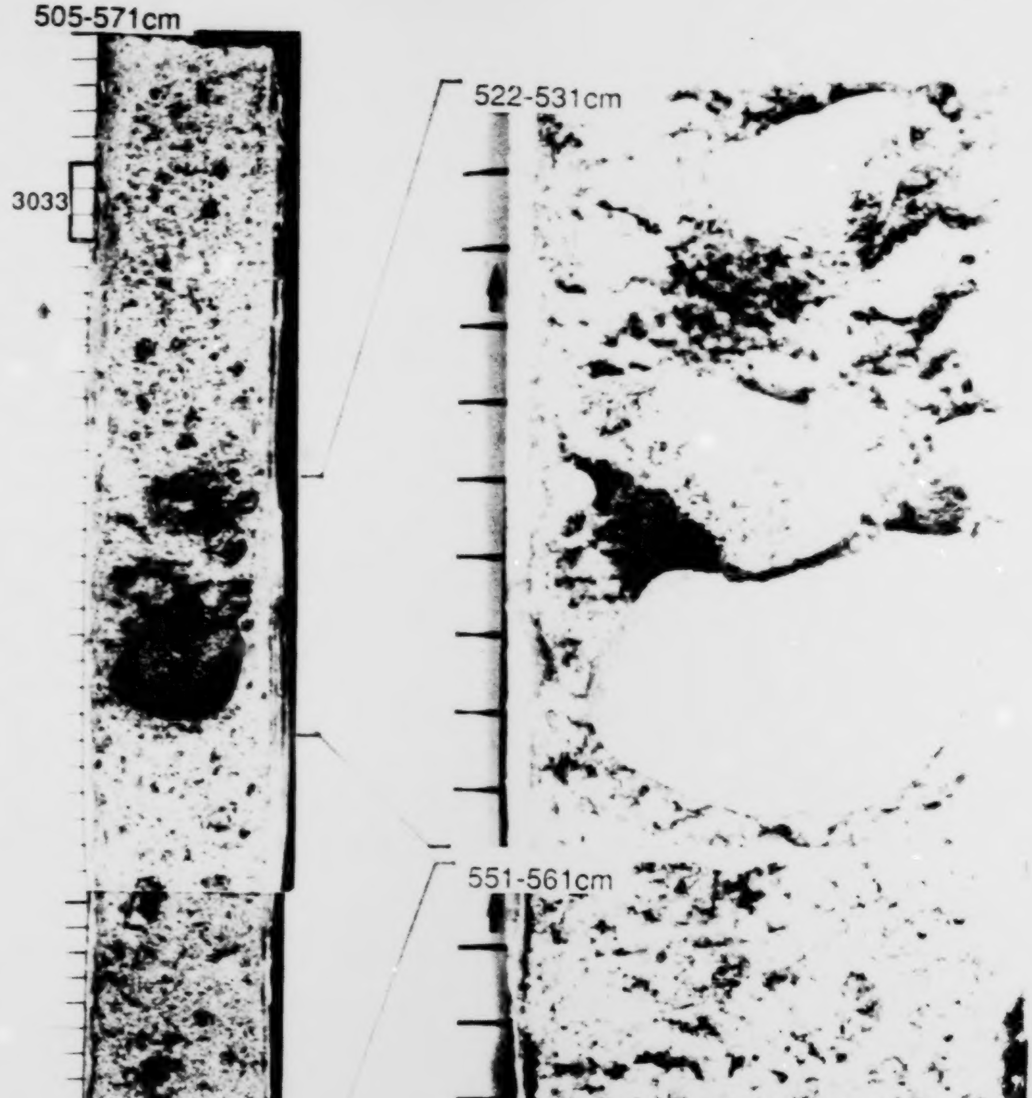
CO-2

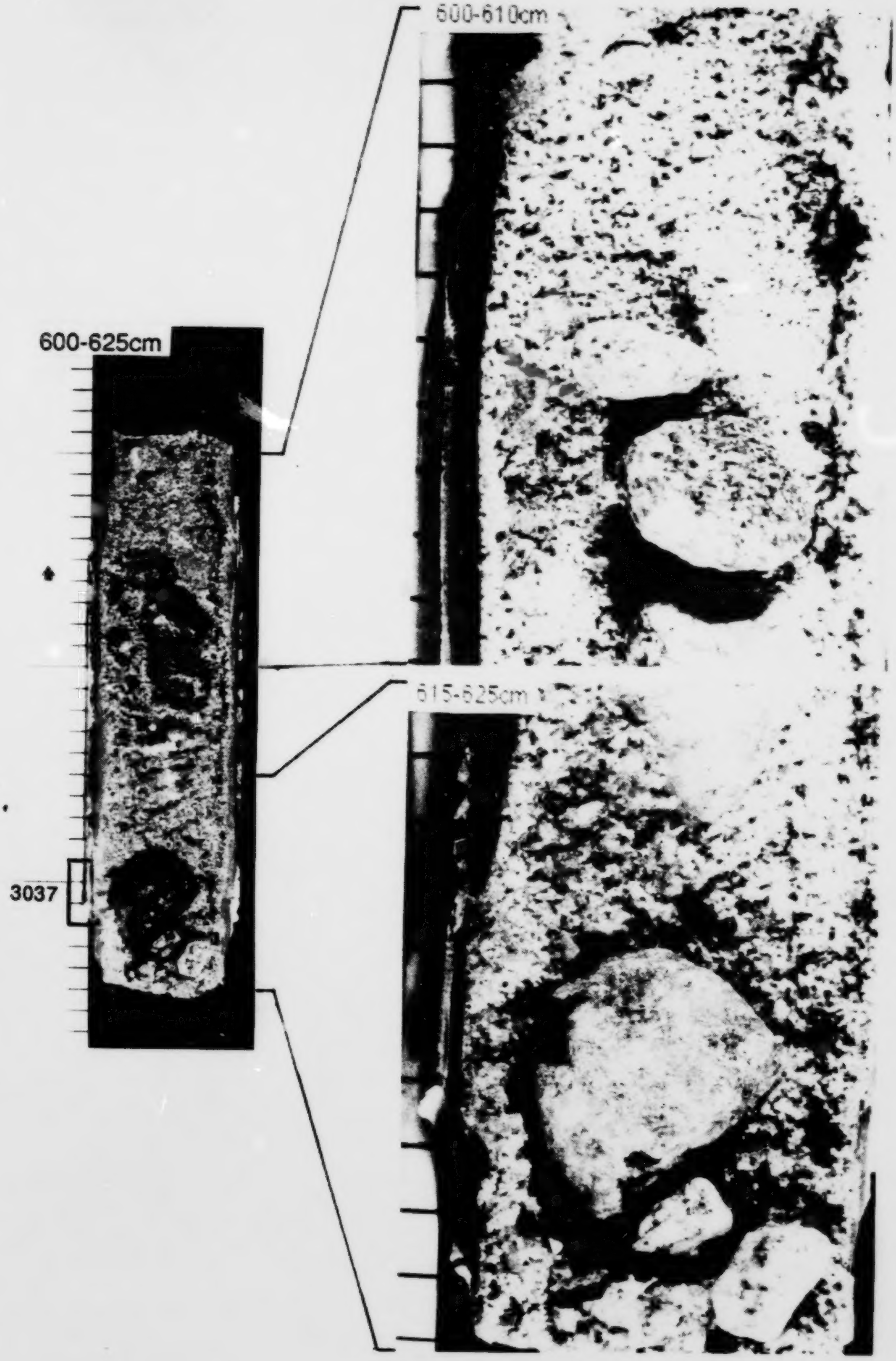

33-43cm
2994
2995
2996
182-203cm
3006
3007
3008
3009
226-252
cm
3013
3014
3015
3016
290-345cm
3018
3019
3020
3021
3022
350-409cm
3023
3024
3025
3026
3027

IN-1

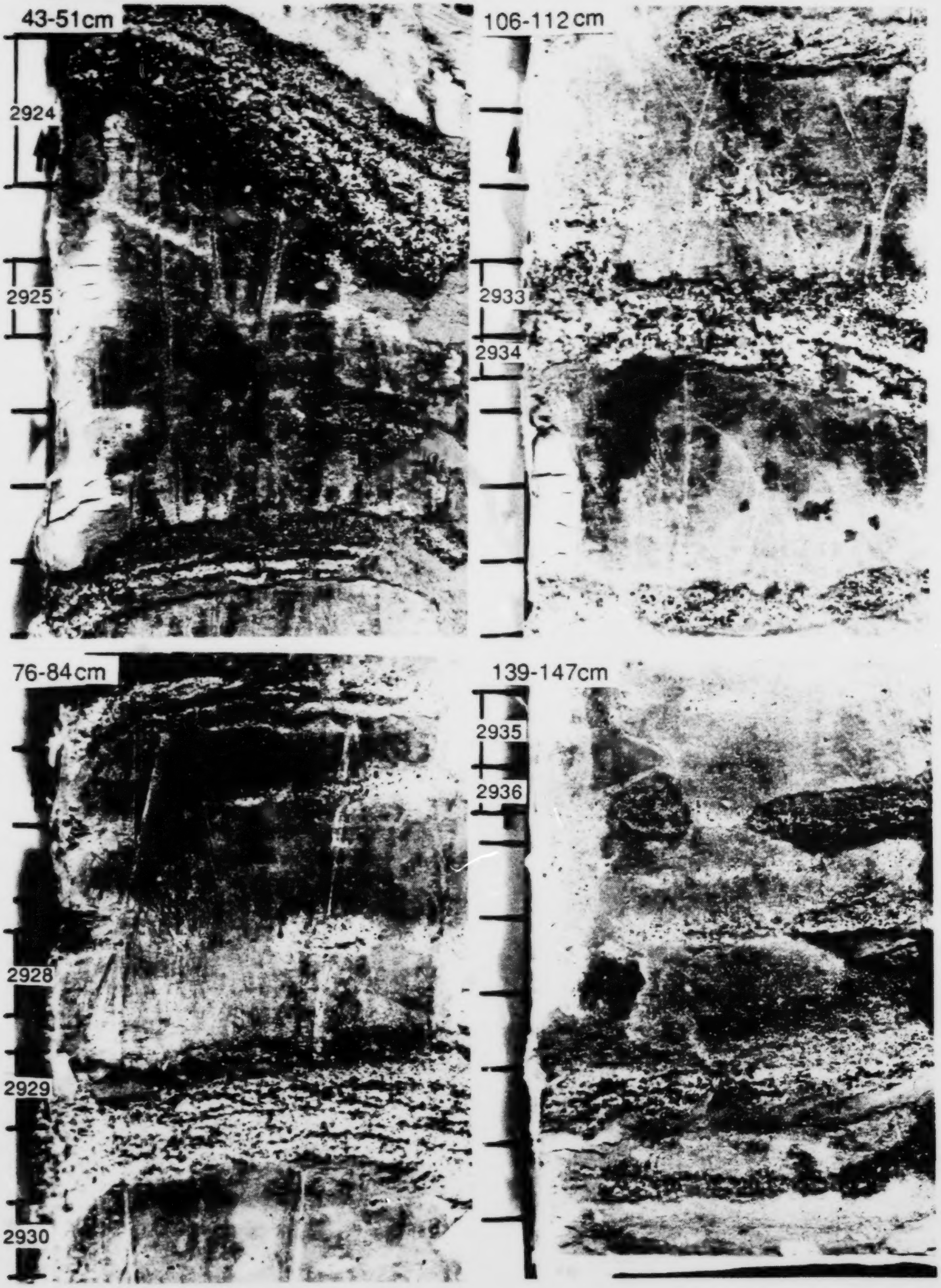

393-425cm
425-486cm
3027
3028
3029
3030
3031
459-470cm

IN-1

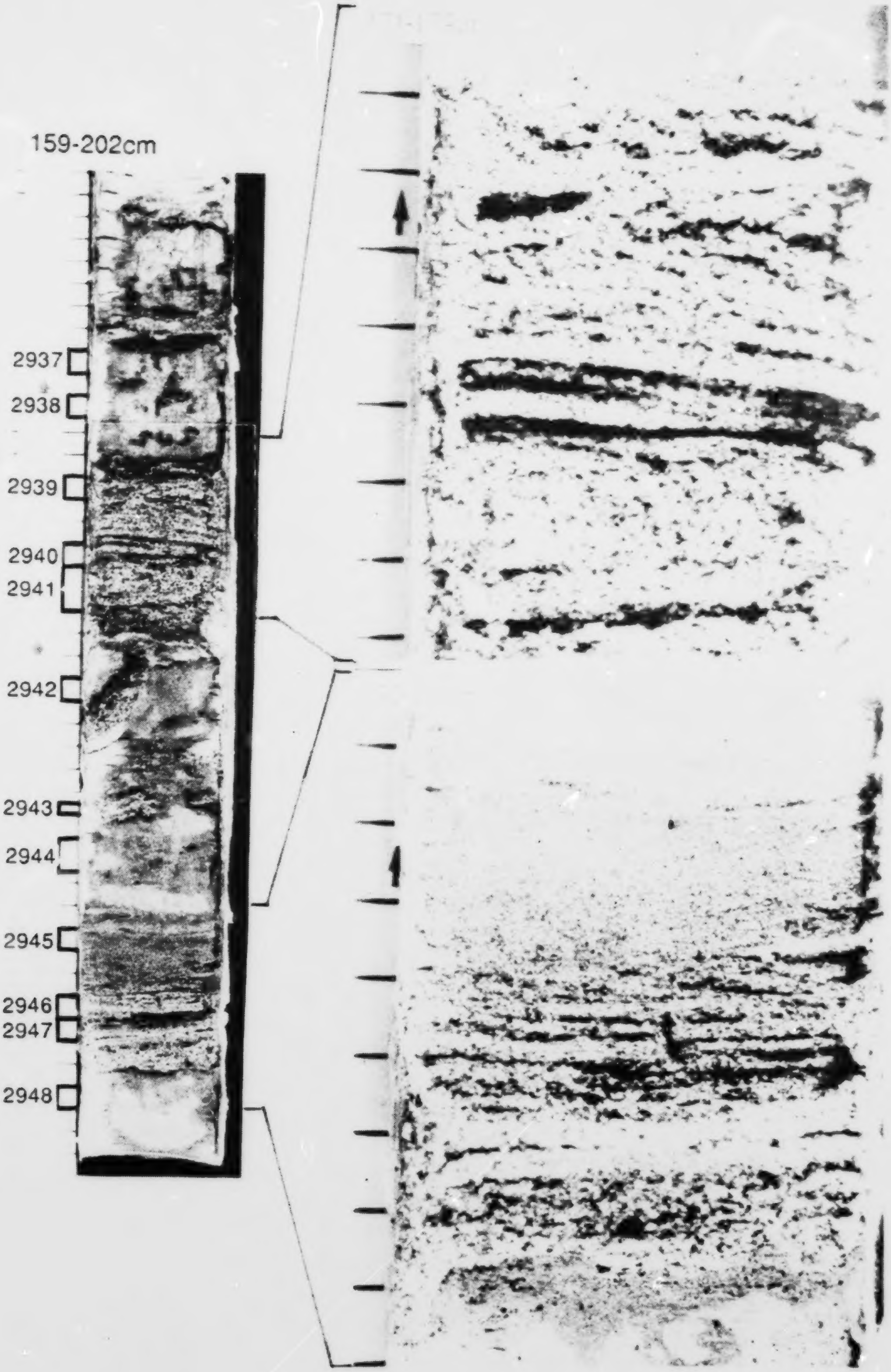

505-571cm
3033
3034
522-531cm
551-561cm
IN-1


600-610cm
600-625cm
3037
615-625cm

IN-1


43-51cm
2924
2925
106-112cm
2933
2934
76-84cm
2928
2929
2930
139-147cm
2935
2936

IN-3


159-202cm
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2938
2939
2940
2941
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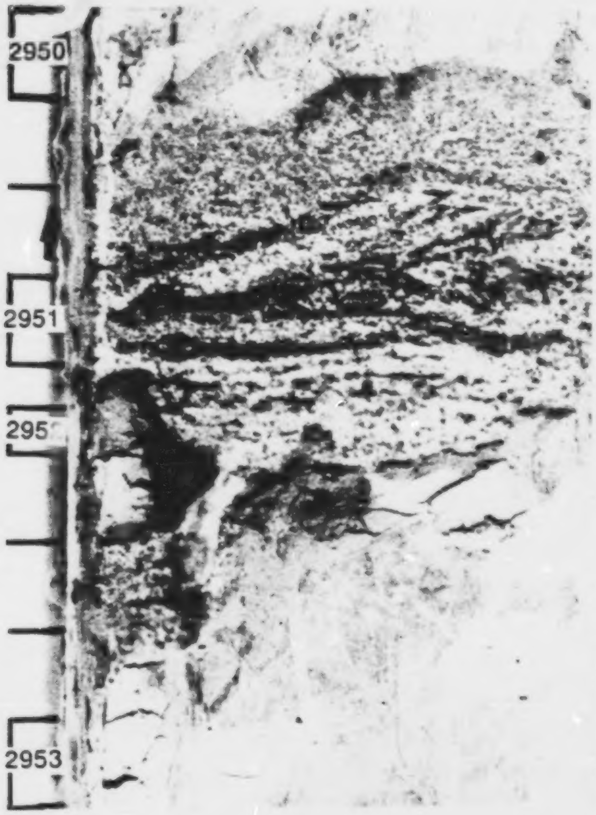
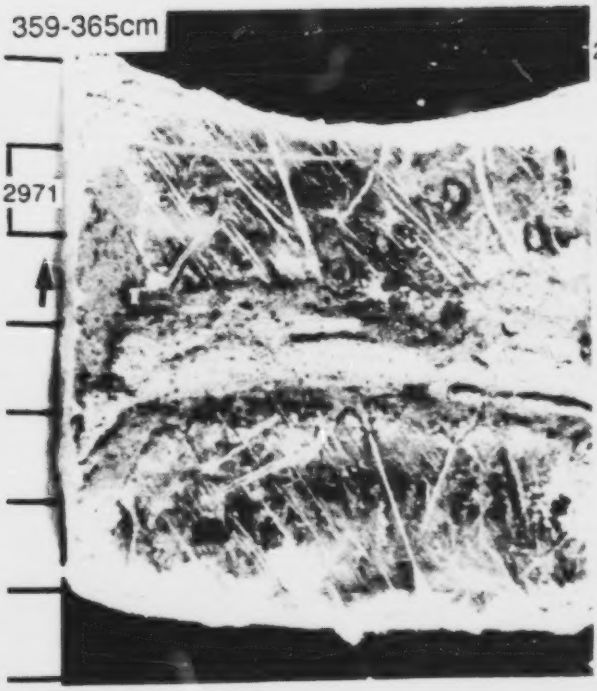
2943
2944
2945
2946
2947
2948

IN-3

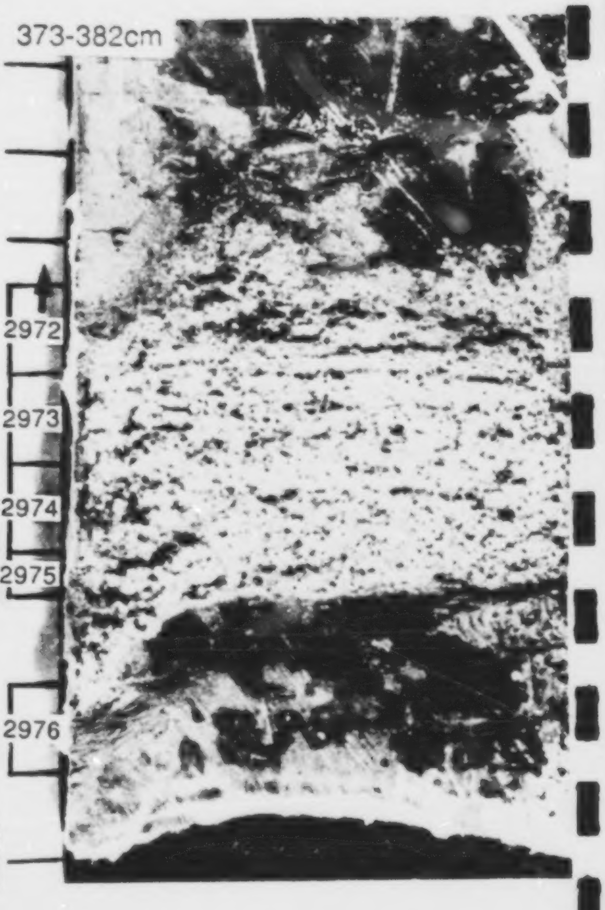
216-225cm


2950
2951
295
2953

359-365cm



373-382cm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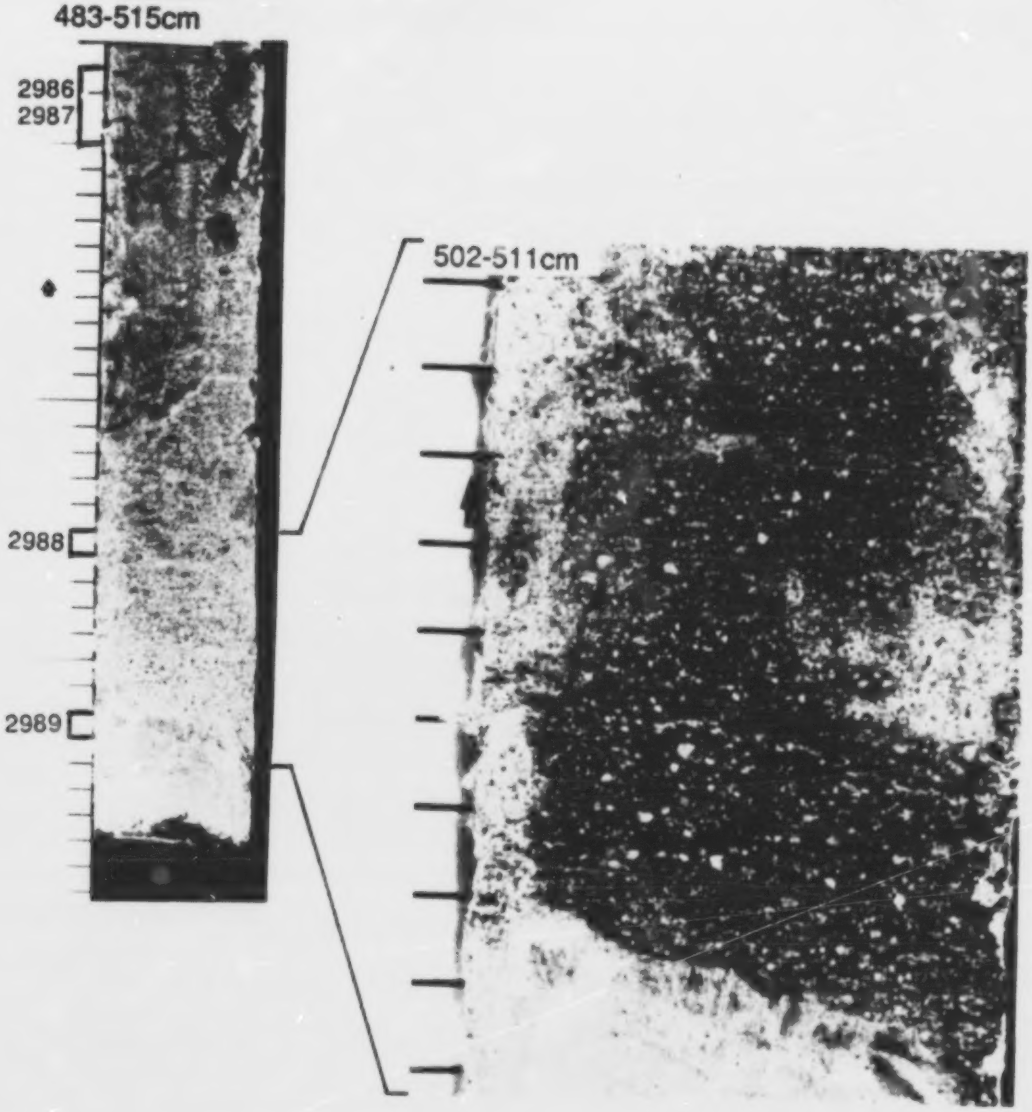
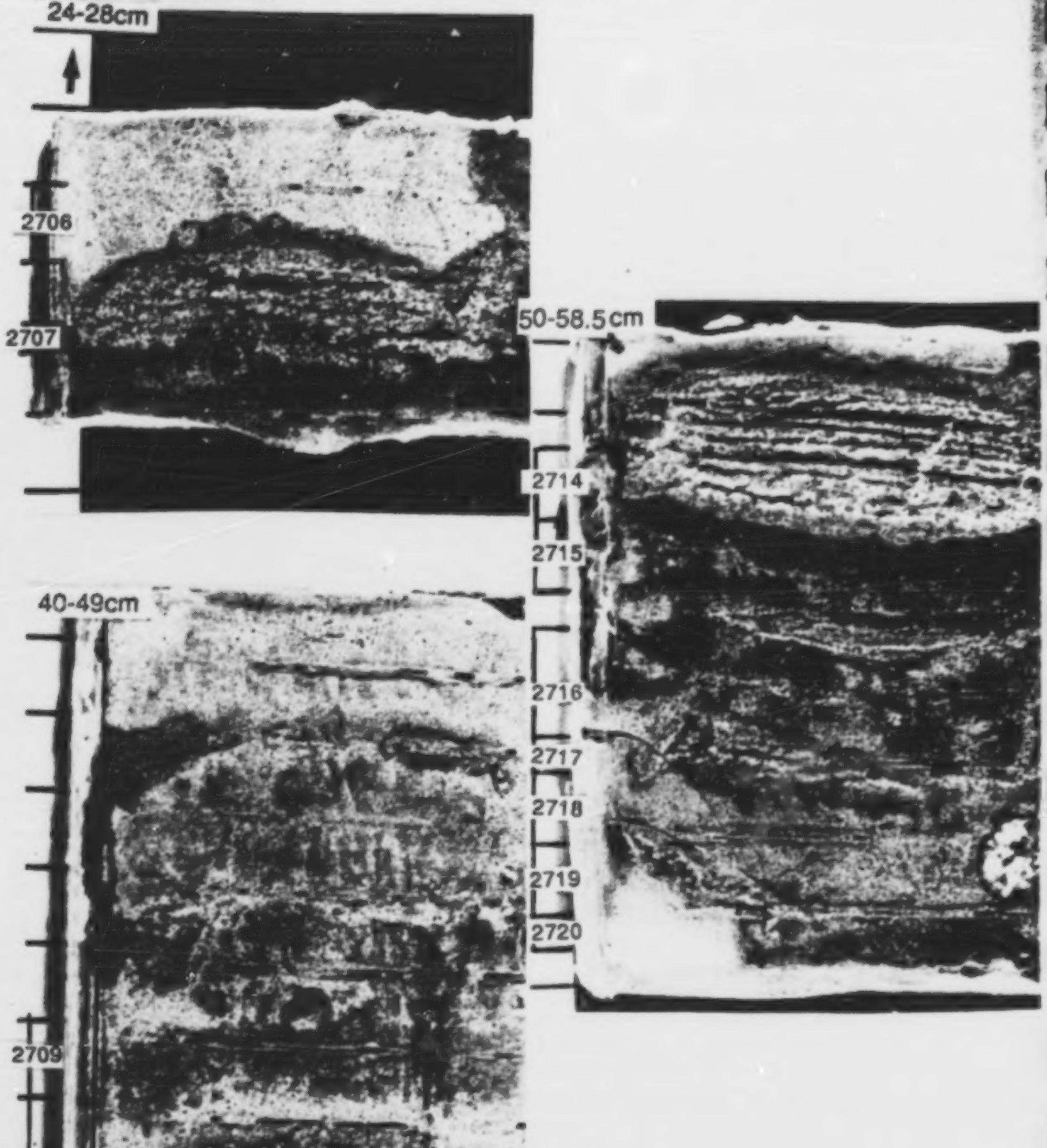
2974
2975
2976

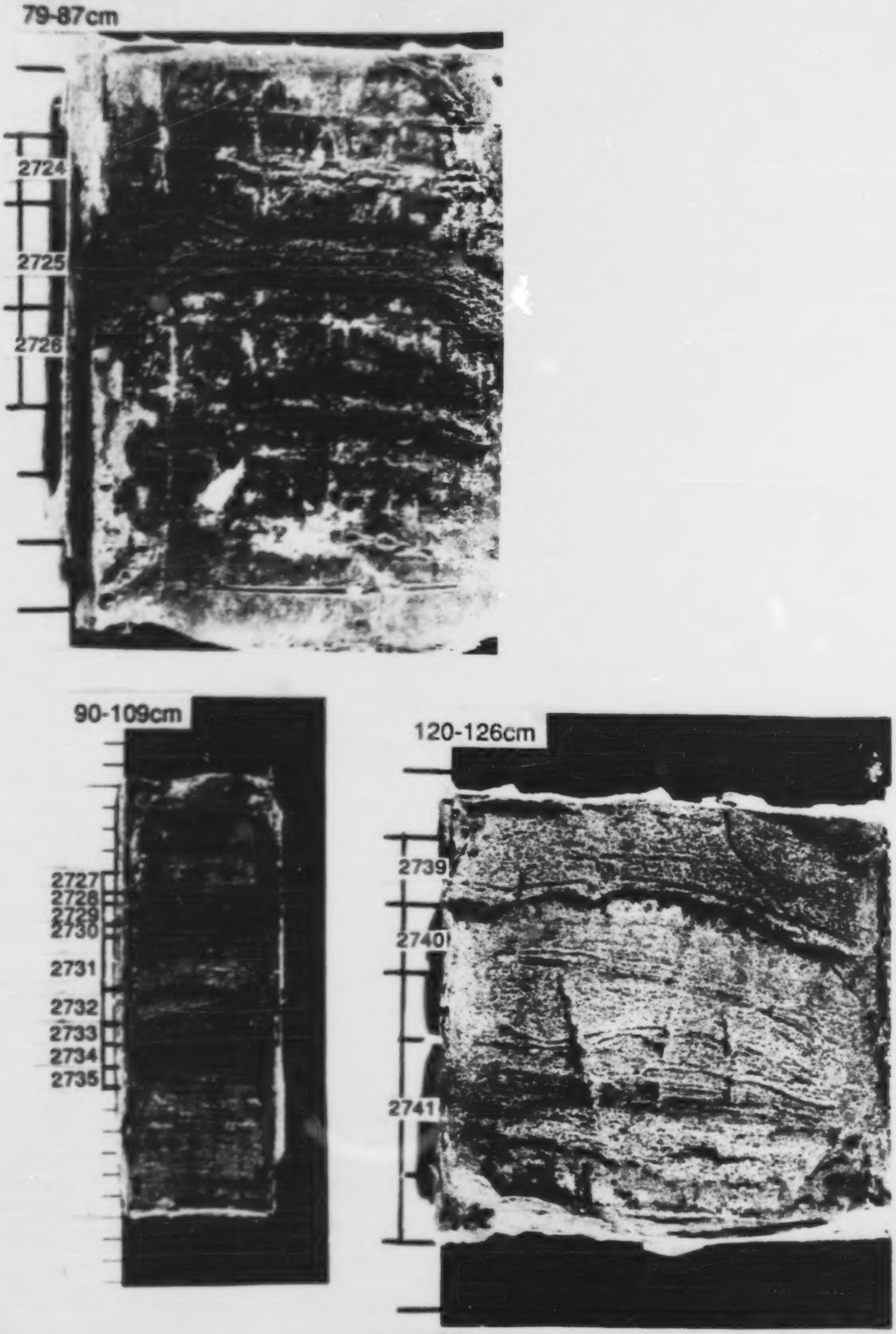
IN-3


483-515cm
2986
2987
2988
2989
502-511cm

IN-3


24-28cm
2706
2707
40-49cm
2709
2710
2711
50-58.5 cm
2714
2715
2716
2717
2718
2719
2720

IT0.1


79-87cm
2724
2725
2726
90-109cm
2727
2728
2729
2730
2731
2732
2733
2734
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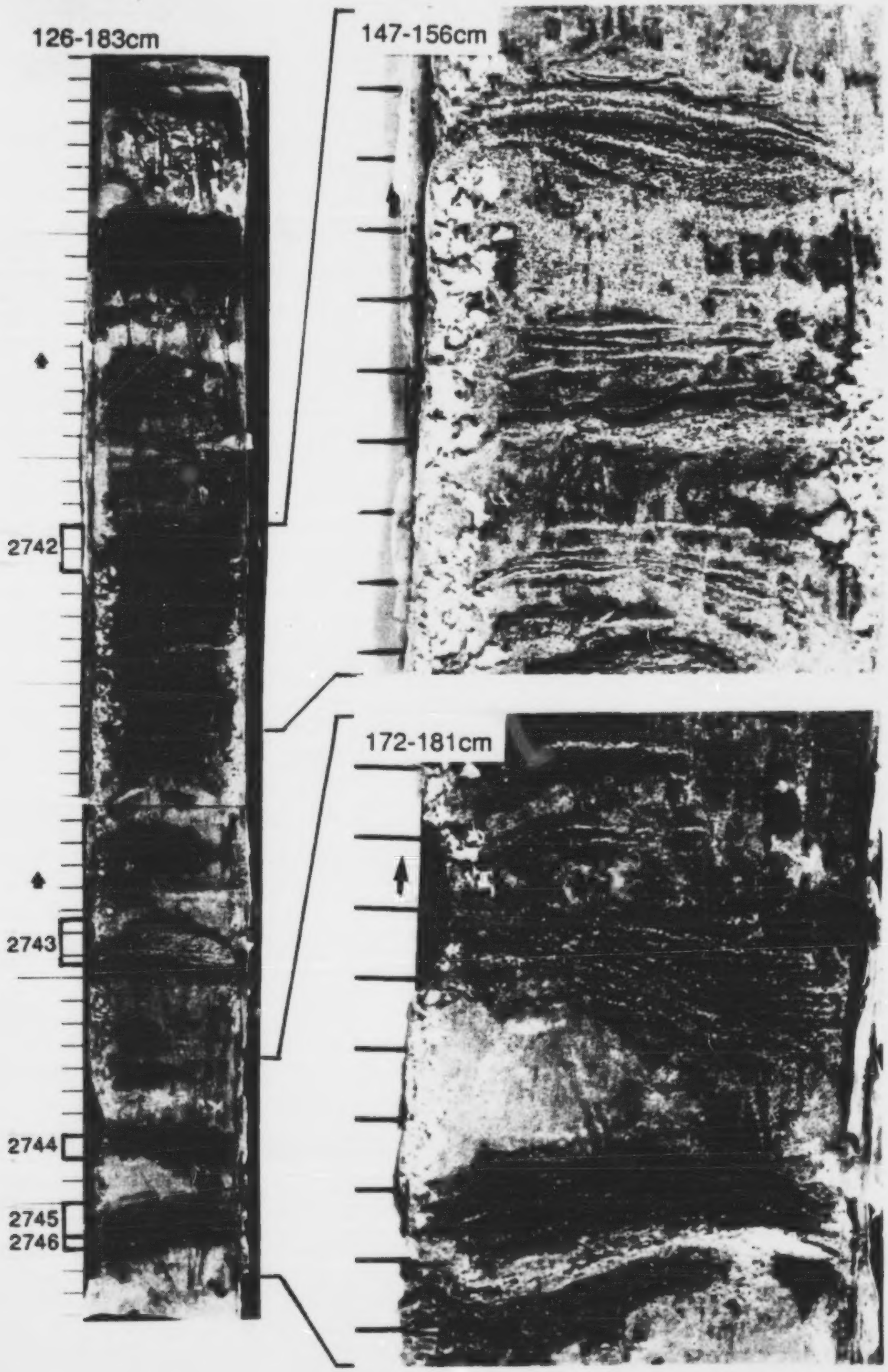
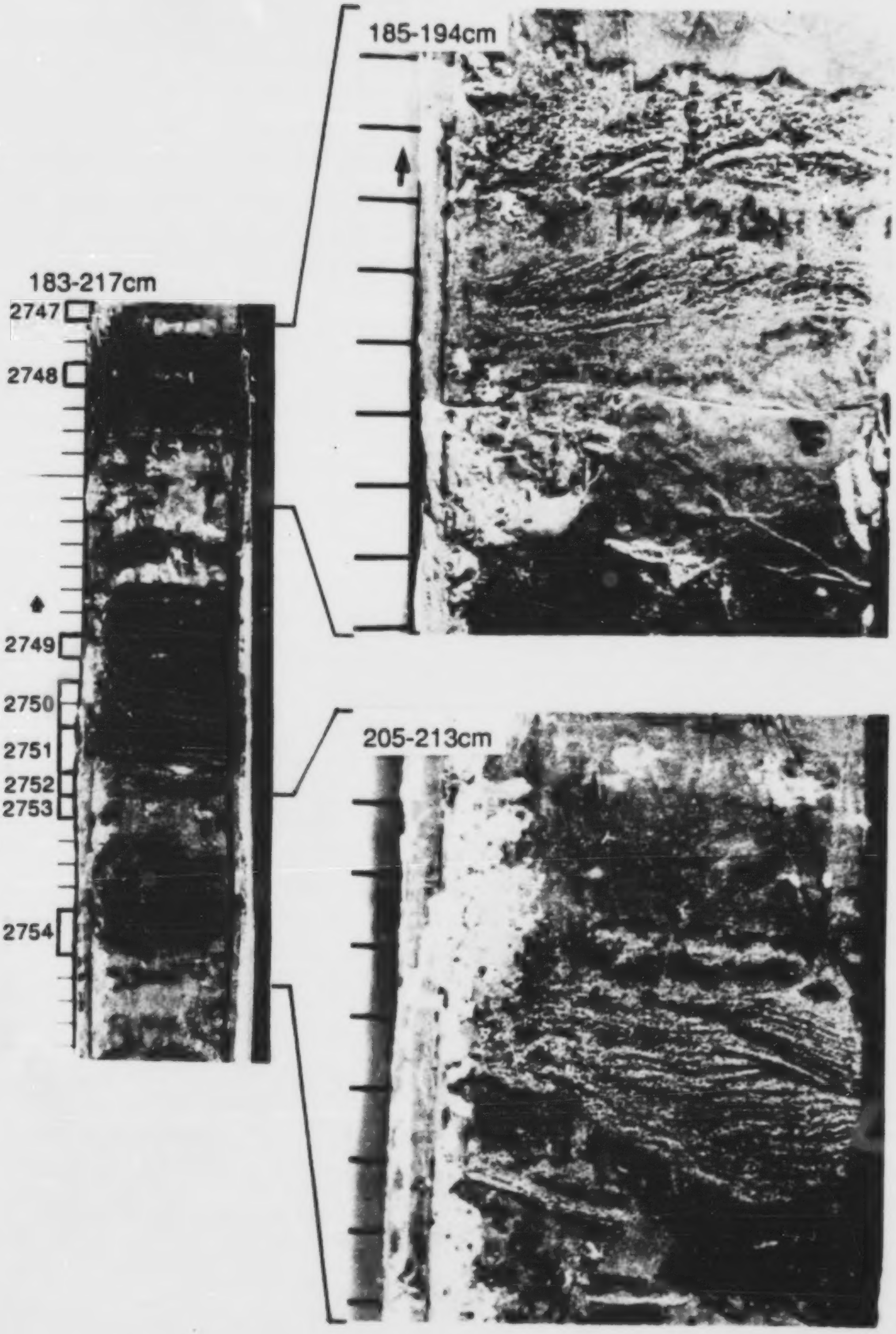
120-126cm
2739
2740
2741

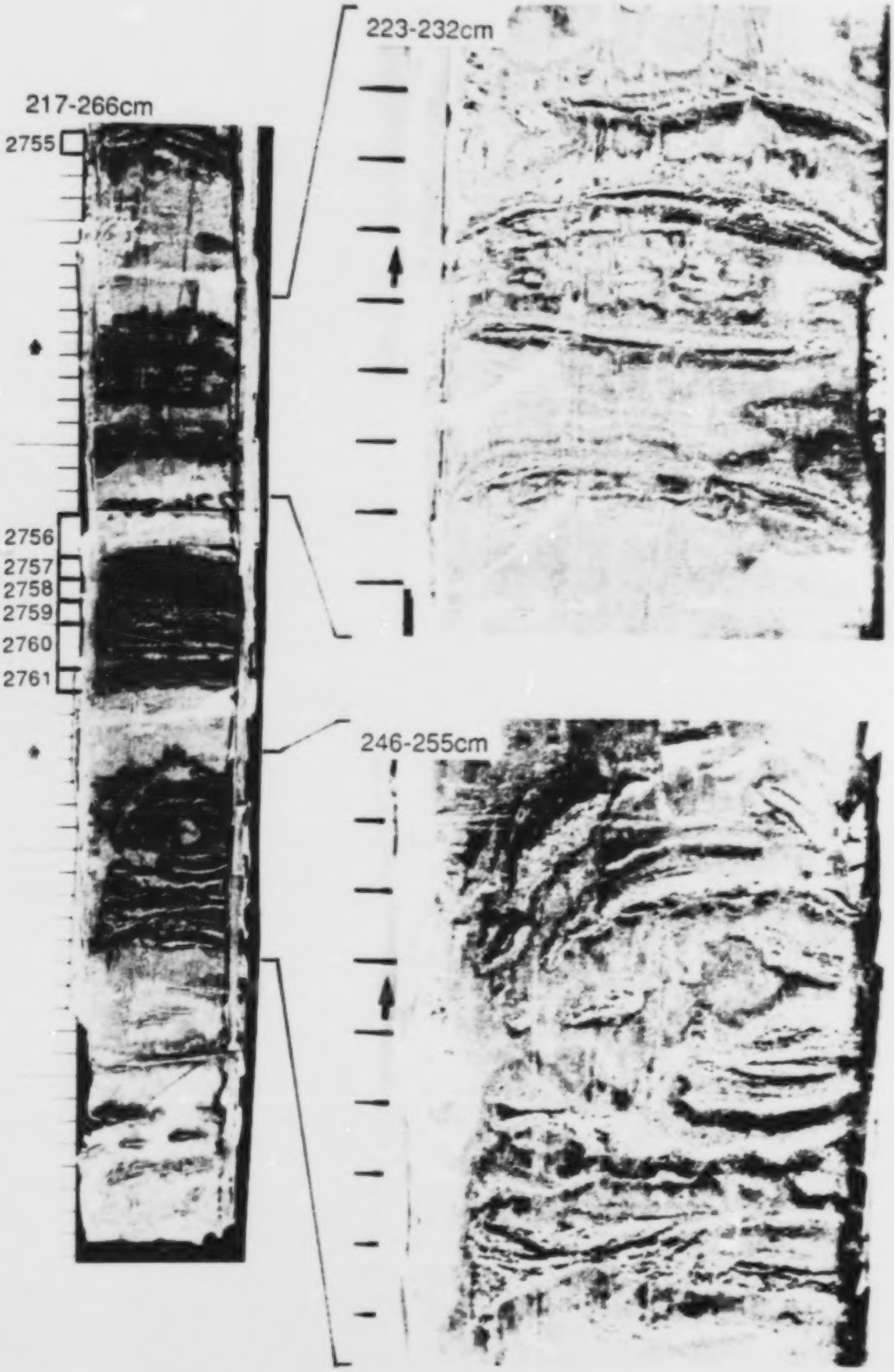
IT0.1


126-183cm
147-156cm
172-181cm
2742
2743
2744
2745
2746

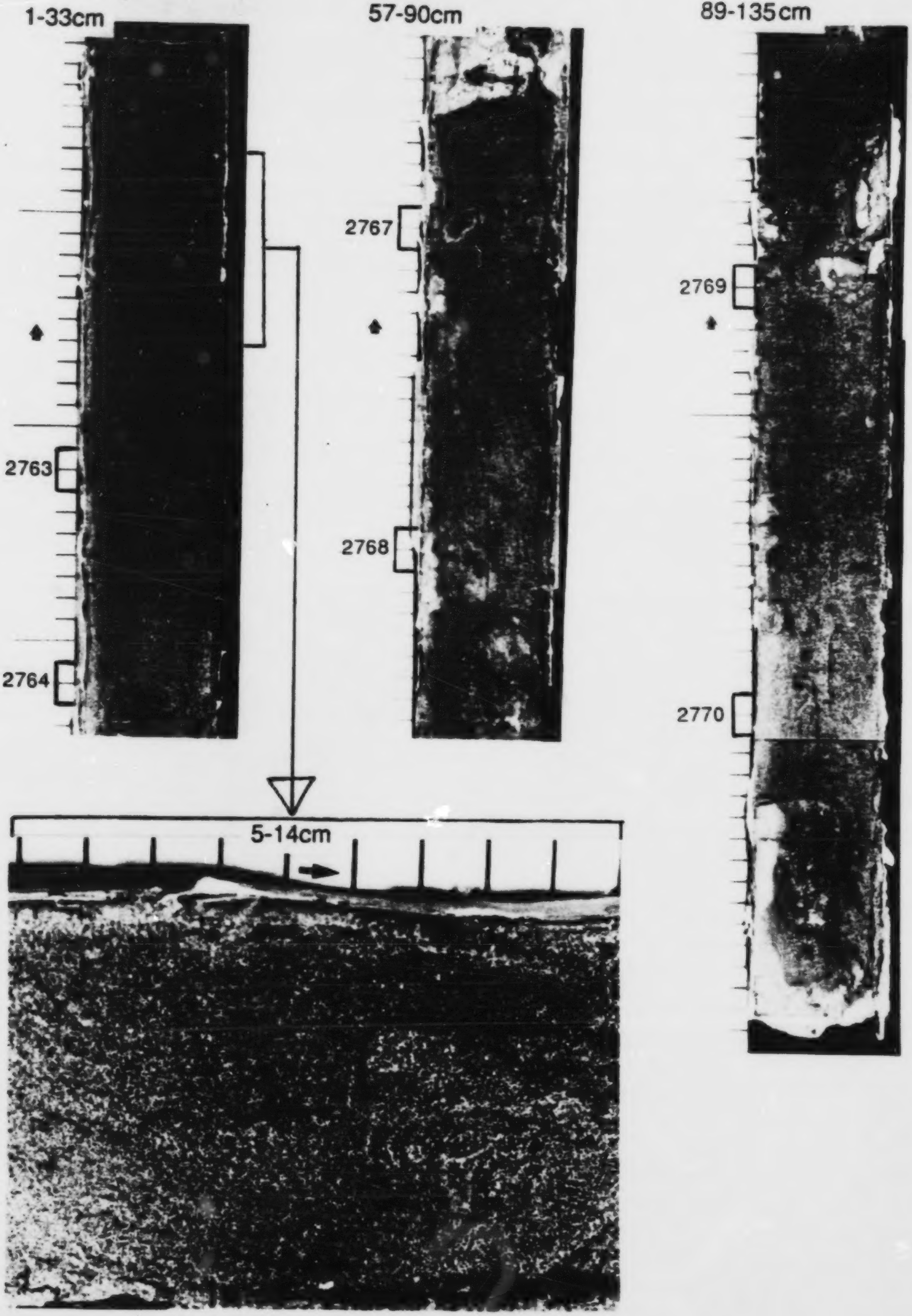
IT0.1


185-194cm
183-217cm
2747
2748
2749
2750
2751
2752
2753
2754
205-213cm

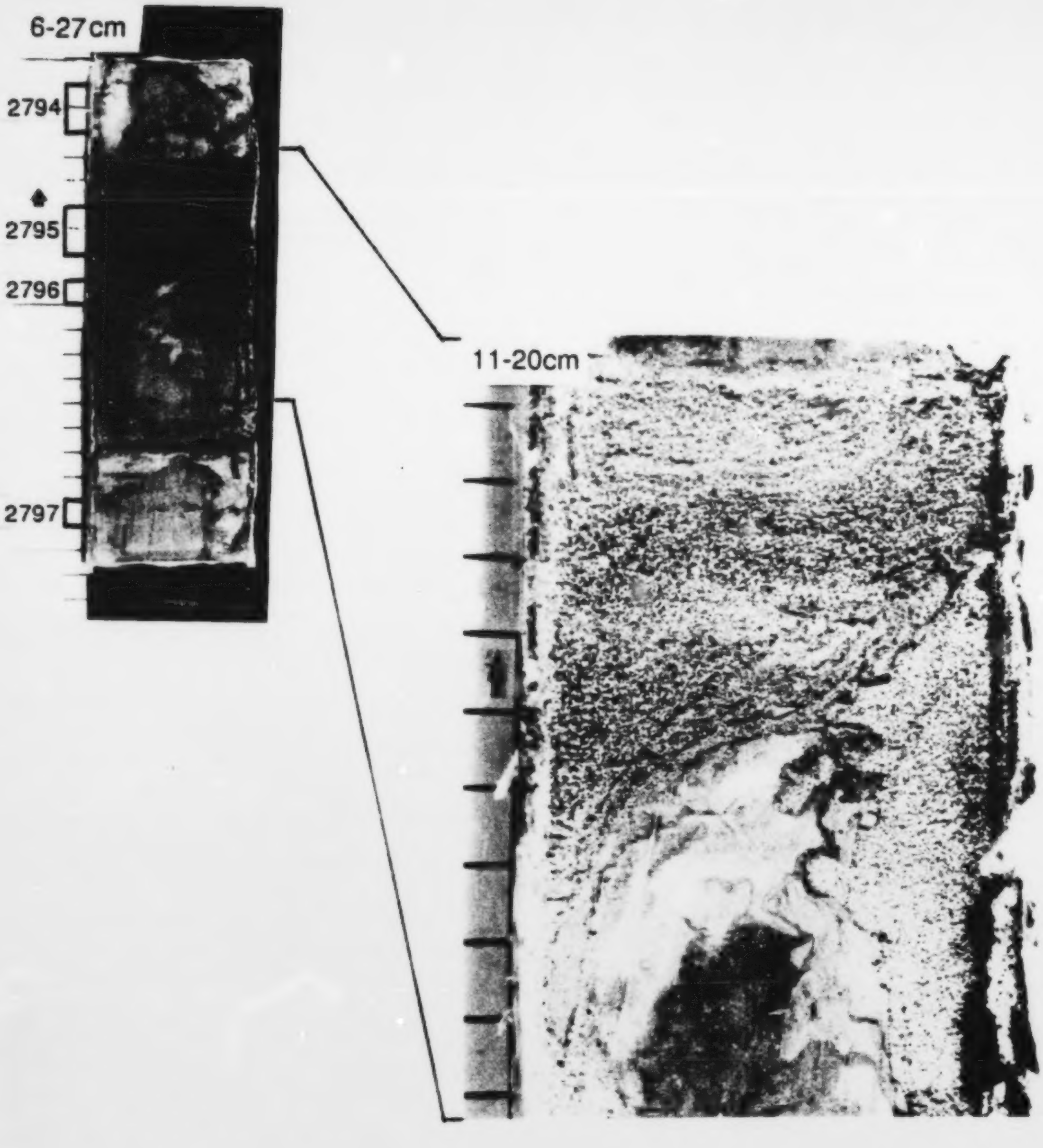
IT0.1


217-266cm
2755
2756
2757
2758
2759
2760
2761
223-232cm
246-255cm

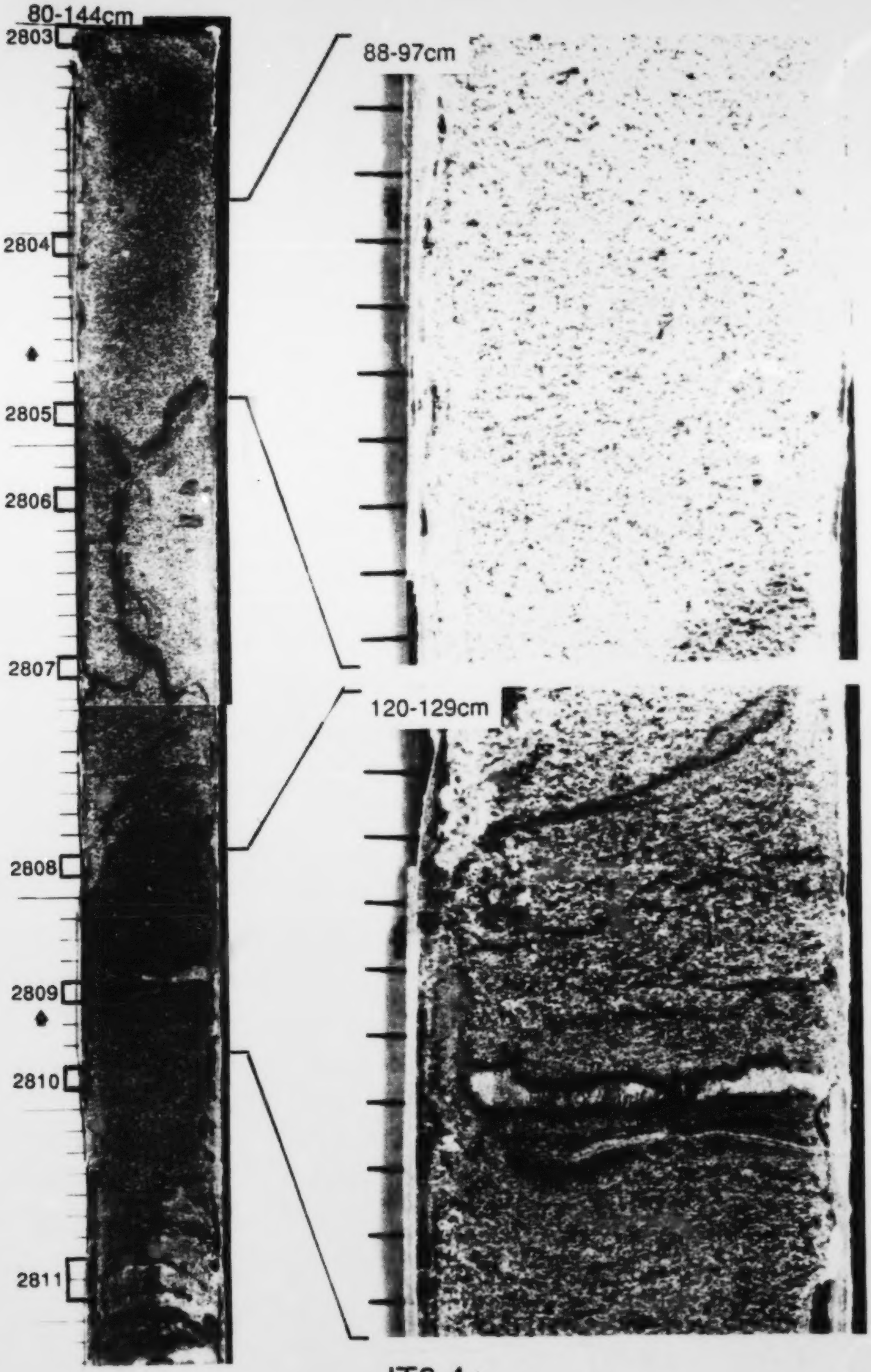
IT0.1


1-33cm
57-90cm
89-135cm
2767
2769
2763
2768
2764
2770
5-14cm

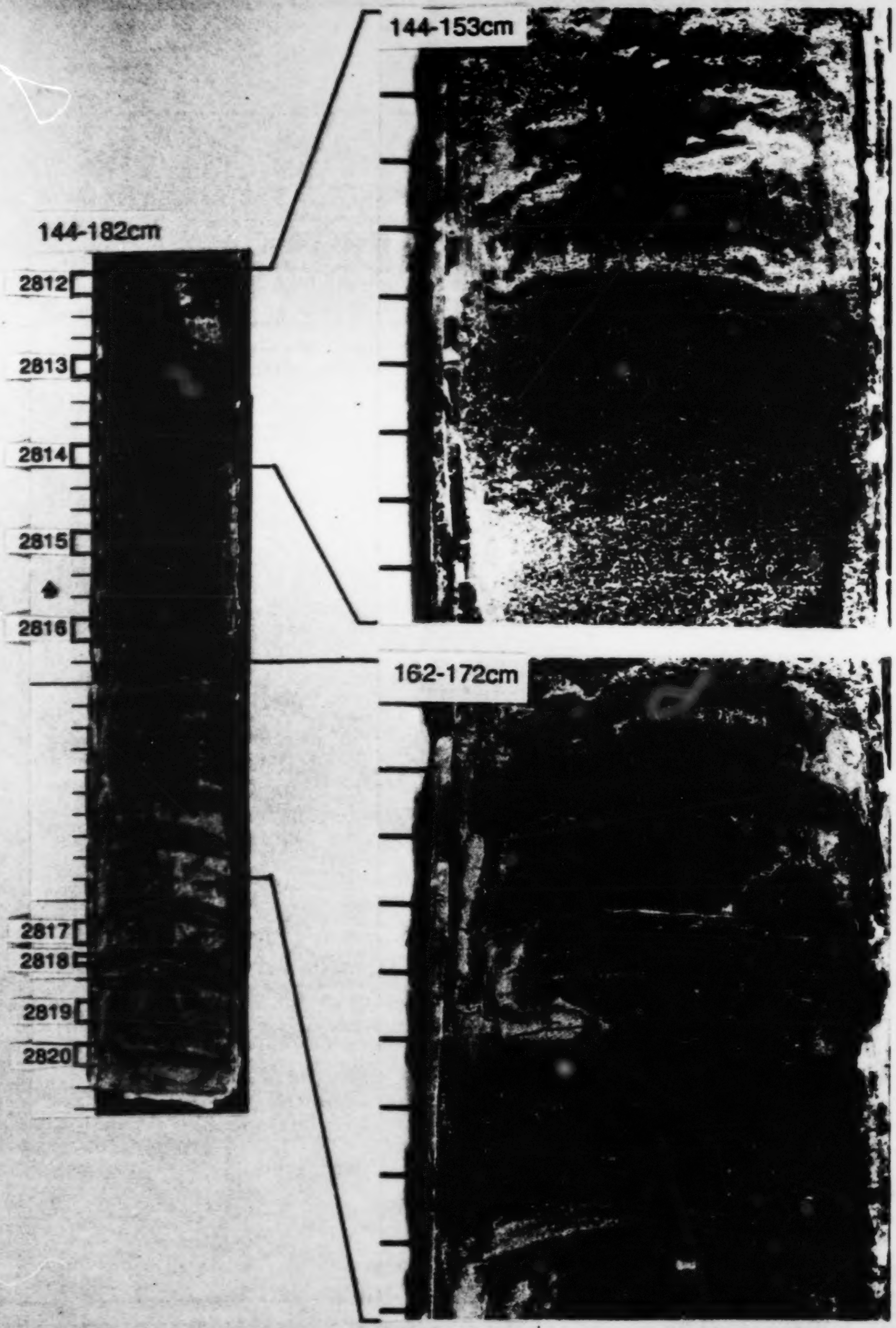
IT0.3


6-27cm
2794
2795
2796
2797
11-20cm

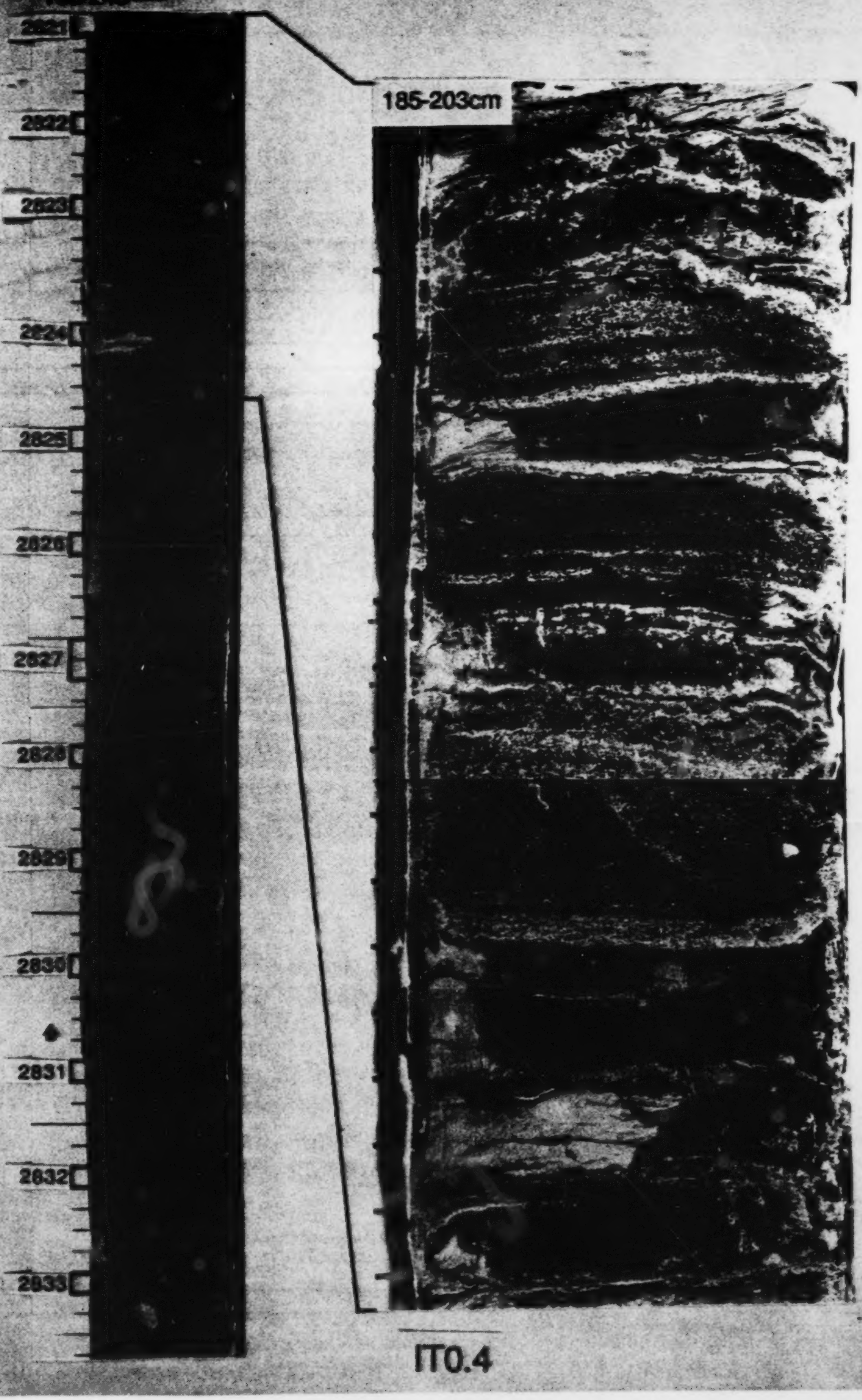
IT0.4


80-144cm
2803
2804
2805
2806
2807
2808
2809
2810
2811
88-97cm
120-129cm

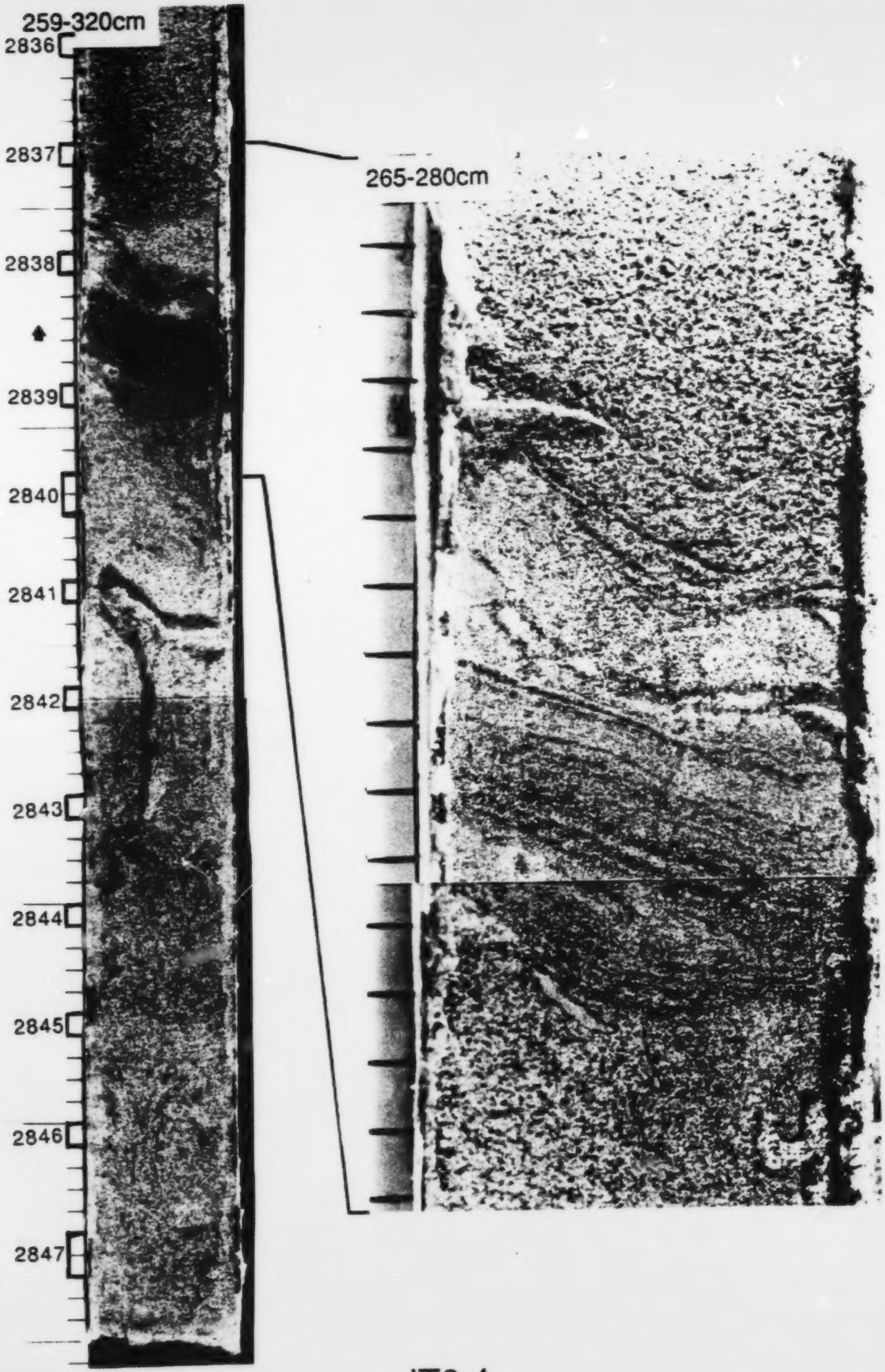
IT0.4


144-182cm
2812
2813
2814
2815
2816
2817
2818
2819
2820
144-153cm
162-172cm

IT0.4

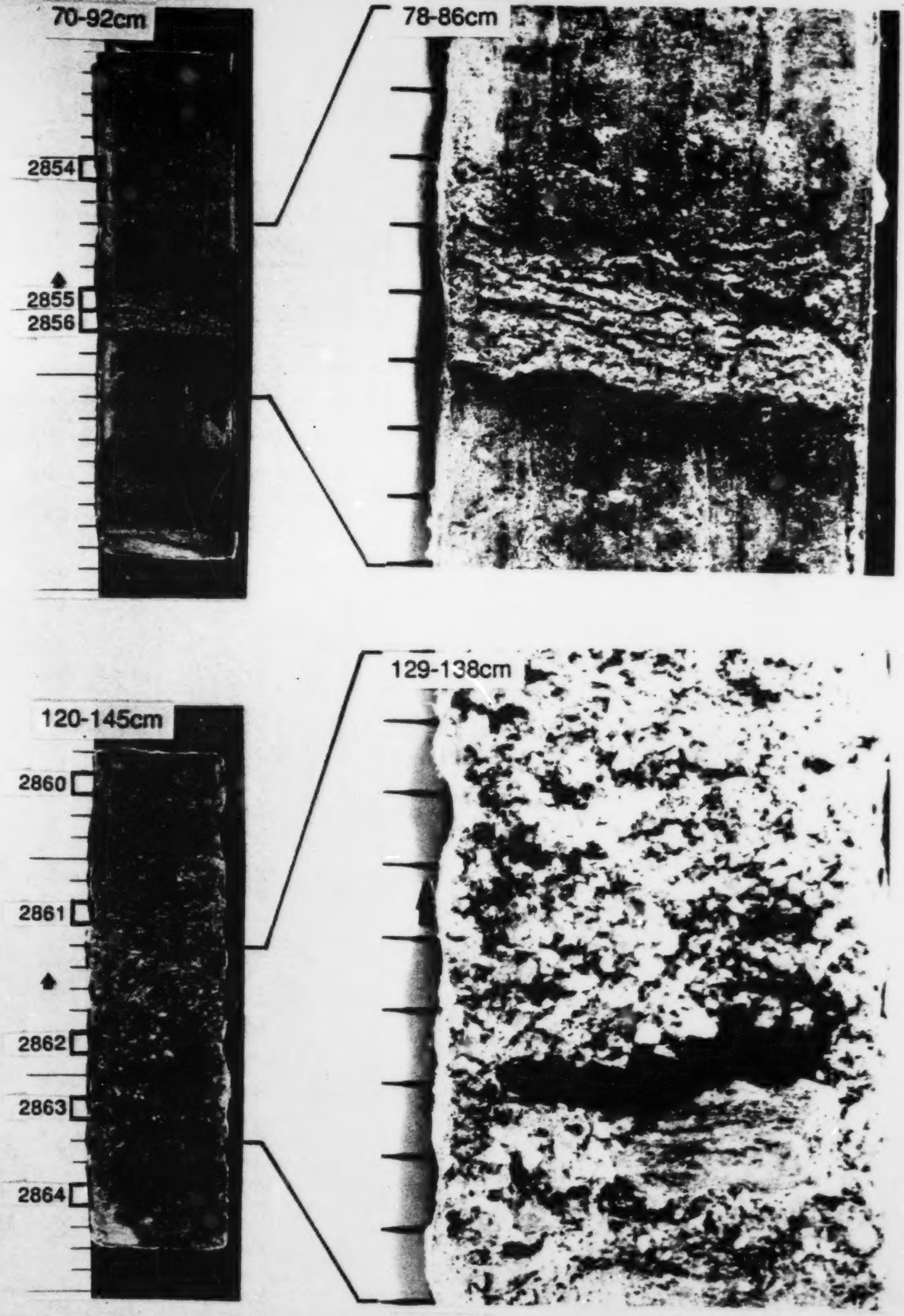

2821
2822
2823
2824
2825
2826
2827
2828
2829
2830
2831
2832
2833
185-203cm

IT0.4

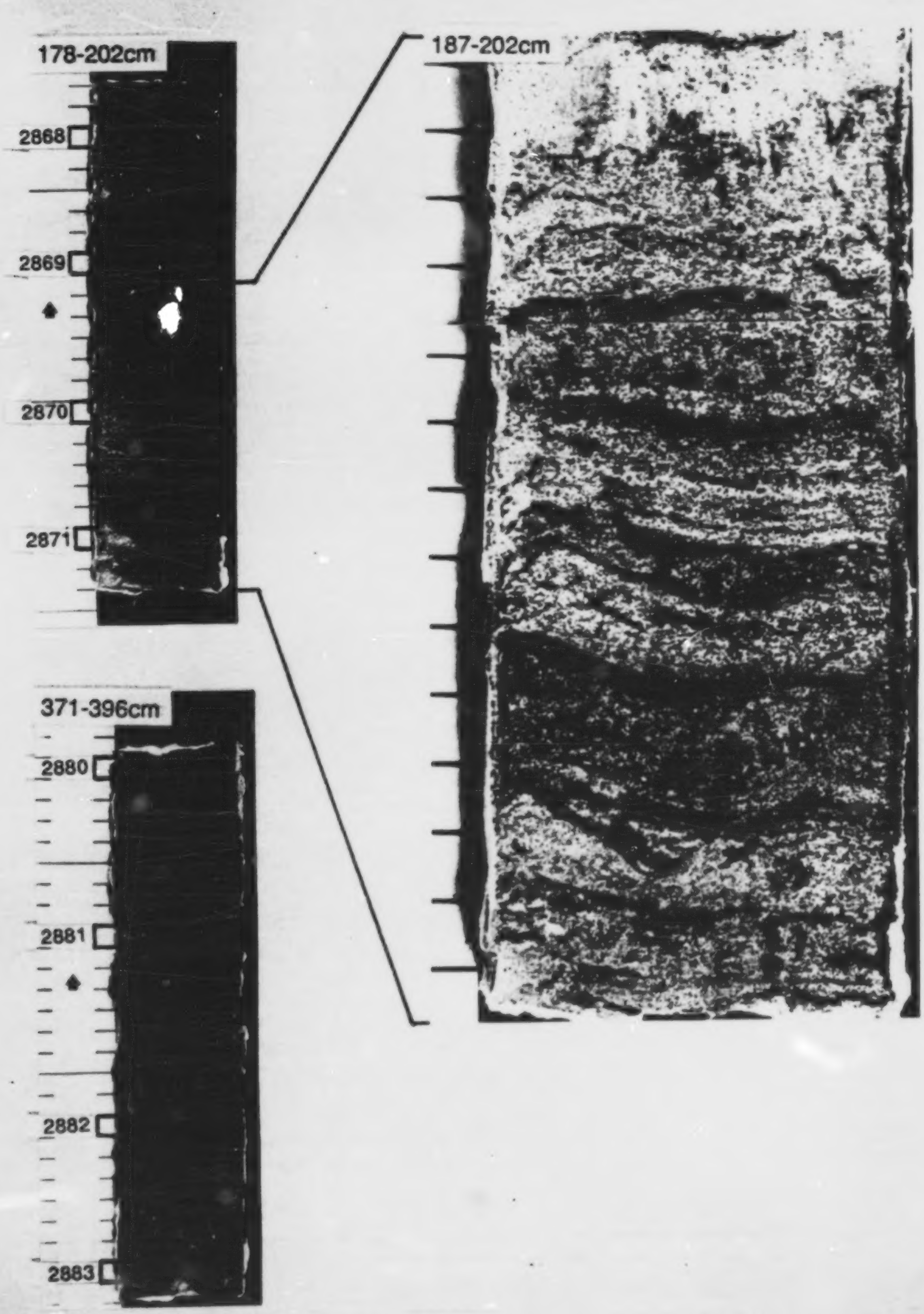

259-320cm
2836
2837
2838
2839
2840
2841
2842
2843
2844
2845
2846
2847
265-280cm

IT0.4

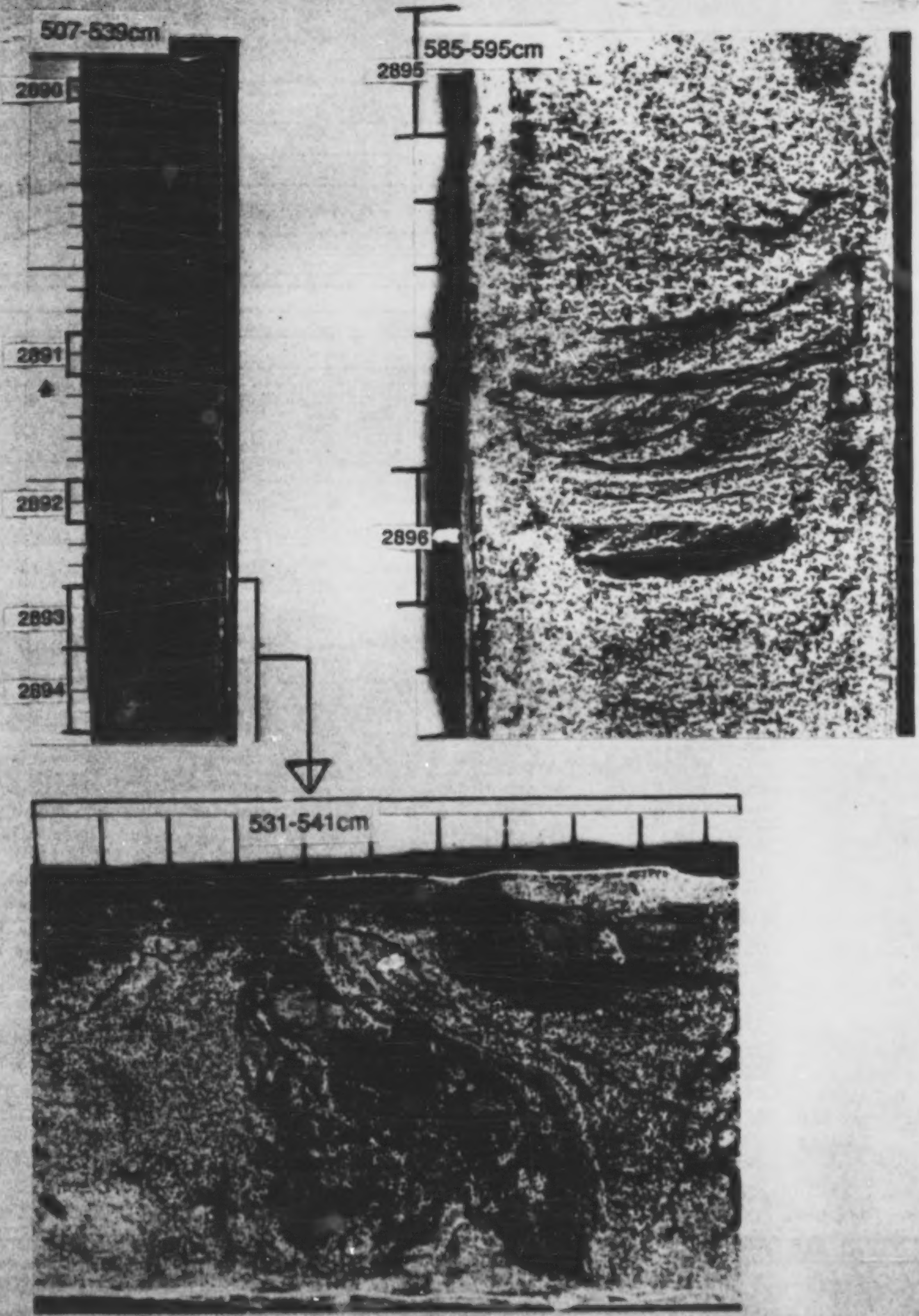
2


70-92cm
2854
2855
2856
78-86cm
120-145cm
2860
2861
2862
2863
2864
129-138cm

IT1.2


178-202cm
2868
2869
2870
2871
187-202cm
371-396cm
2880
2881
2882
2883

IT1.2

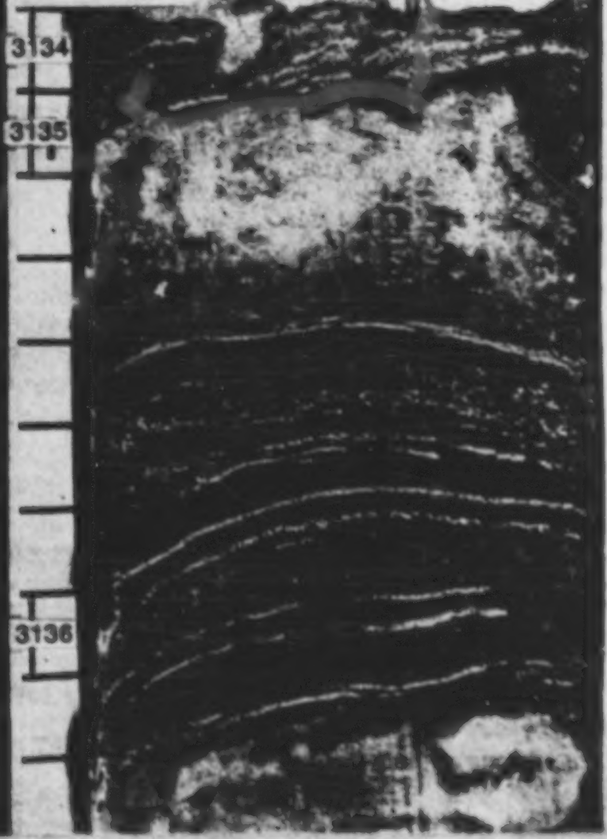

507-539cm
2890
2891
2892
2893
2894
585-595cm
2895
2896
531-541cm

IT1.2

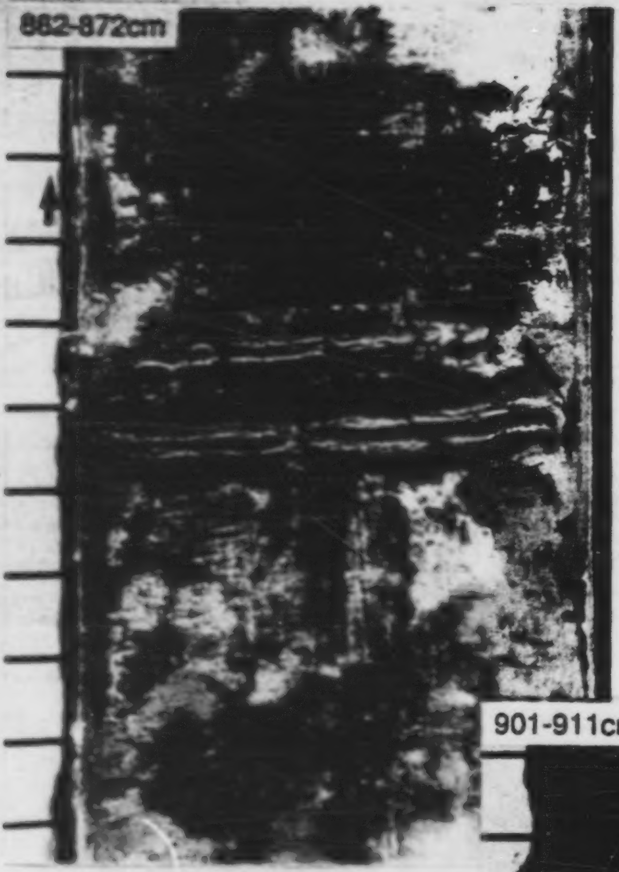
764-772cm

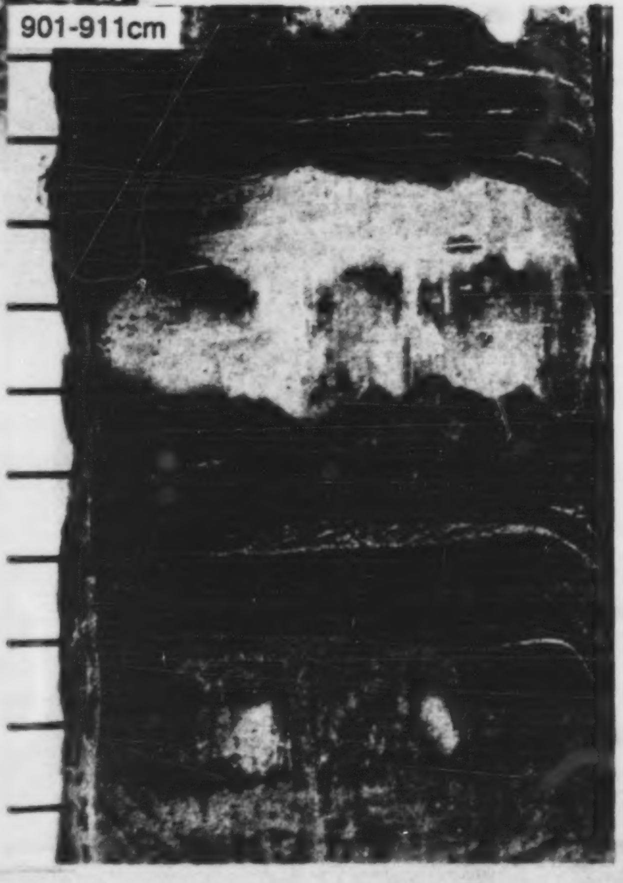
816-826cm

827-837cm

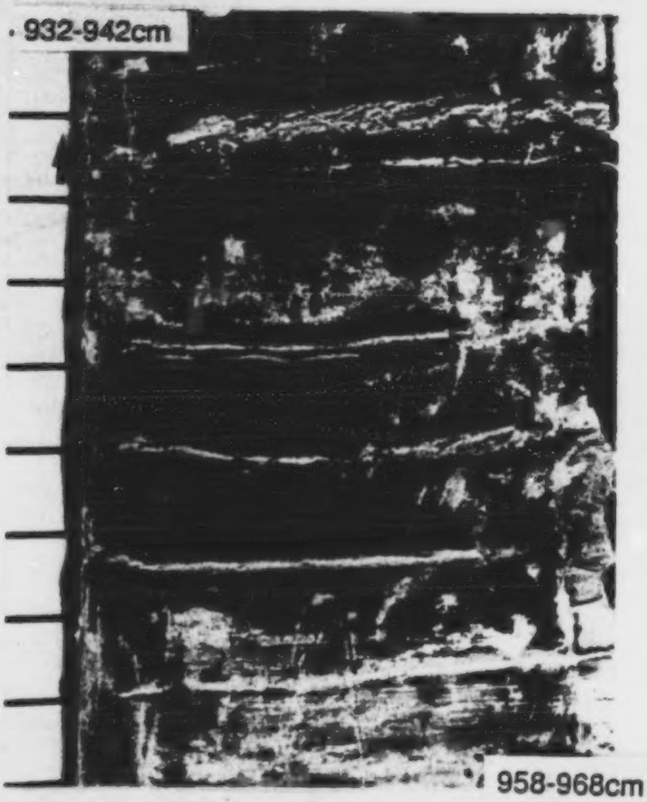

3134
3135
3136

MA-2



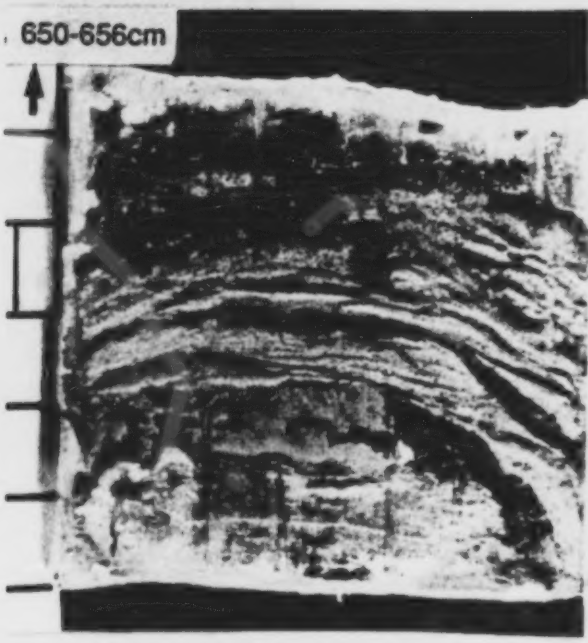


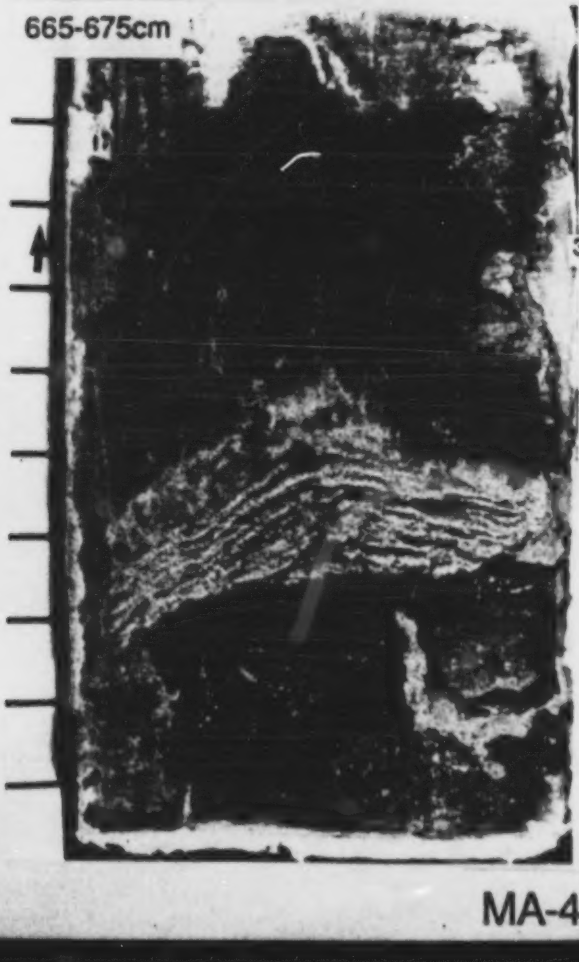
MA-2

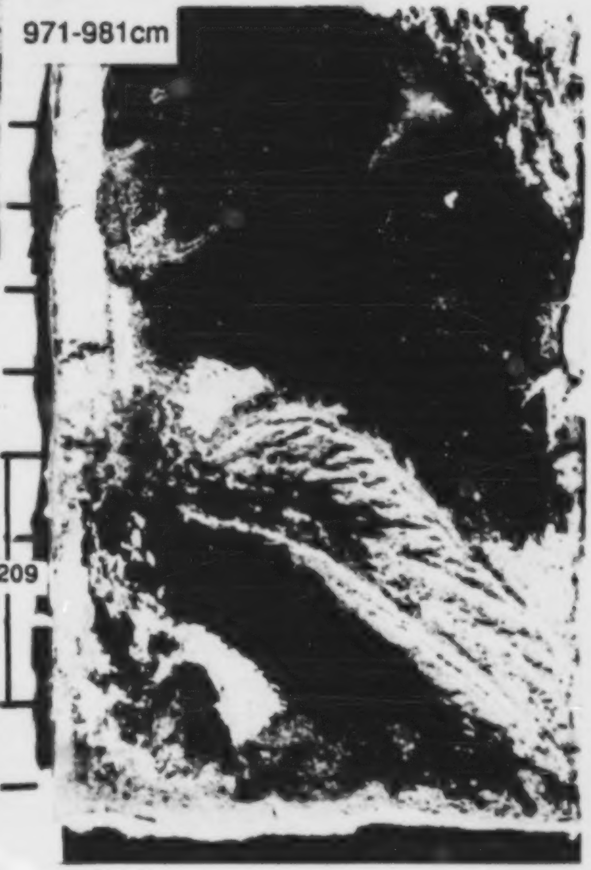


958-968cm
3141
3142

MA-2


650-656cm


665-675cm


971-981cm

3209

MA-4

CHAPTER 9

CORE LOGS FOR HU83-028 PISTON CORES AND PA85-062 LEHIGH CORES FROM ITIRBILUNG FJORD

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Halifax, N.S., B3H 3J5

OBJECTIVES

1) Detailed (mm-cm) logging of cores on a bed-by-bed basis.

2) Detailed documentation of sedimentary structures and grain size variations to serve as a data base for a facies summary of Baffin fjords.

3) Nine piston cores and two Lehigh cores were studied (Table 1, Figure 1).

METHODS

Cores were logged by visual examination of the archive halves of split cores which are in storage at the Atlantic Geoscience Centre. Because there was a long time delay between initial core-splitting and detailed core-logging, only the general coloration of the cores was noted (i.e. the Munsell color charts were not used). Previous workers had logged the general sedimentological features and Munsell color designations immediately after core-splitting; hence, these earlier descriptions are most appropriate for color variation.

The cores were logged on a 'bed-by-bed' basis for those beds >1cm in thickness; bands on a mm-scale were logged as laminated facies. The cores were described in terms of the features discernable in split core, and in accompanying X-radiographs, which include: approximate grain size (as seen by eye or hand lens), sedimentary structures, bedding style and nature of contacts. Detailed verbal core descriptions are presented in this chapter. Graphical presentations, facies descriptions and interpretations will be presented in Syvitski and Hein (in prep.).

TABLE 1: CORE LOCATION INFORMATION

	CORE	LATITUDE (N)	LONGITUDE (W)	DEPTH (M)	LENGTH (M)
HU83-028:	IT0.1	65°16.20'	69°14.40'	73	2.66
	IT0.3	65°17.50'	69°11.00'	155	4.30
	IT0.4	69°17.90'	69°12.10'	155	3.25
	IT1.1	69°20.00'	69°03.80'	256	7.93
	IT1.2	69°20.80'	69°01.50'	293	6.24
	IT2.1	69°20.30'	68°51.20'	325	2.50
	IT2.2	69°19.30'	68°45.50'	400	8.02
	IT2.3	69°17.50'	68°27.00'	424	7.33
	IT3.1	69°17.60'	68°12.30'	365	4.59
PA85-062:	20B	69°16.4'	69°14.3'	91	.94
	20D	68°16.6'	69°15.6'	85	.34

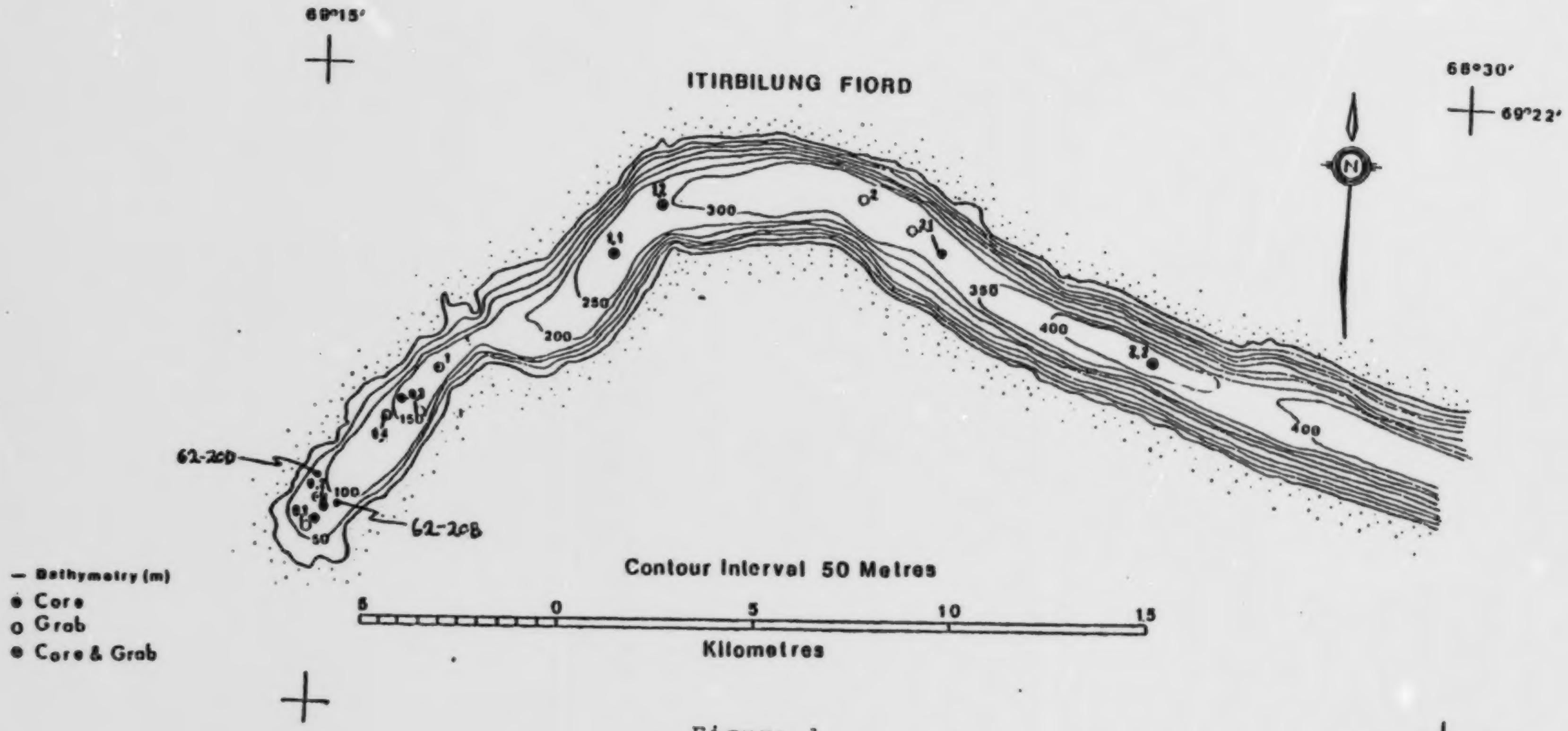
68°15′
ITIRBILUNG FIORD
68°30′
69°22′
N
300
250
200
150
100
50
350
400
400
62-200
62-208
Contour Interval 50 Metres
5
0
5
10
15
Kilometres
— Bathymetry (m)
● Core
o Grab
● Core & Grab
69°14′

Figure 1

CORE: IT0.1 Archive 1/2 LENGTH: 0-126 cm

Note: Top 2 cm slightly disturbed during coring. Tan/grey fine micaceous (muscovite) sand, with irregular, ? loaded, base.

2-10 cm. Tan/grey. Silty clayey mud with dispersed fine sand (o.3 mm grain size). Mottled with irregular, sand-filled burrows. Irregular, ? bioturbated base.

10-11 cm. Tan/grey. Medium to fine micaceous (muscovite) sand (0.3 - 0.5 mm grain size). Scalloped based, loaded.

11-15 cm. Disturbed by coring, bowed-up laminae. Graded-stratified bed. Fine to medium sand (0.3-0.5 mm grain size) at base, graded into silty sandy mud at top, with dispersed fine sand (0.3 mm grain size) at top. Irregular, ? bioturbated base. Bed is laminated in the lower half. Lamination (few mm thick) consists of openwork fine sand (0.3-0.5 mm grain size) alternating with more dispersed fine sand (0.3 mm grain size) in a silty mud.

15-16 cm. Couplets of fine sand laminae (0.3 mm grain size), 1 or 2 grains thick, alternating with tan silty laminae, 2-3 mm thick.

16-18.5 cm. Seven, graded-laminated sand and silt couplets. Basal sands have sharp, loaded bases, and are mainly dark micaceous (biotite and muscovite) medium to coarse (grain size 0.3 - 1 mm) sands, up to 2 mm thick, alternating with tan muddy silt bands with dispersed fine-medium sand (0.3-0.5 mm grain size), 2-4 mm thick.

18.5-19 cm. Inverse-to-normally graded 'triplet' lamina, consisting of a basal openwork sand (0.5 mm grain size; 1 mm thick) grading into a tan silty mud with dispersed fine sand (0.3-0.5 mm grain size, 3 mm thick), topped by an upper openwork sand (0.5 mm grain size; 1 mm thick).

19-24 cm. Five, graded-laminated sand and silt couplets. Basal sands have sharp bases and are mainly dark micaceous (biotite and muscovite) or clear quartz, medium to coarse (grain size 0.3 - 1 mm) sands, 1-2 mm thick, alternating with tan silty muds with dispersed fine-medium sand (0.3-0.5 mm grain size), 2-12 mm thick.

24-28 cm. Prominent normally graded bed, with pulsating bands of tan/green/grey coloration. Bands are vaguely defined, with gradational boundaries, and most likely represent sublte changes in the size and concentration of the dispersed sand-size material. Basal 1 cm consissts of a very well graded, white micaceous (muscovite) coarse sand (1-1.5 mm grain size), which has a scoured base. In the next 8 mm upsection, the basal white sand grades into a slightly darker micaceous medium to fine sand (0.3-0.5 mm grain size).

28-29 cm. Well-graded sand to silty mud. Base is sharp, irregular ? loaded. The base consists of fine-sand size quartz (0.2-0.3 mm) with up to medium size muscovite (0.5-0.7 mm grain size) openwork sand, grading into mainly silty mud with dispersed fine sand particles (0.3 mm grain size).

29-41 cm. Eight, vaguely laminated fine sands alternating with silty mud with dispersed fine sand material (biotite, muscovite and quartz). Sands are sharp based, with irregular ? loaded bases and graded into the overlying silty muds. Darker basal sands are 2-5 mm thick, overlying lighter tan silty muds are 8-20 mm thick.

41-52 cm. Slight core disturbance, with concave-up bowing-up of laminae. Ten, well laminated fine to medium sands (0.3-0.5 mm grain size) alternating with silty mud with dispersed fine sand material (0.3 mm grain size). Sands are sharp based, with irregular ? loaded/bioturbated bases and graded into the overlying silty muds. Darker basal sands are 1-2 mm thick, overlying lighter tan silty muds are 8-15 mm thick. The lowest 3 cm consists of a very well graded bed, with a white quartz sand in the basal 6 mm, grading to a dark micaceous sand over the next 13 mm, topped by pulsing bands of light laminae (5 mm thick, consisting of dispersed fine sand (0.3 mm grain size) in a silty mud and dark sand laminae (2 mm thick; grain size 0.3 mm).

52-63 cm. ? Disturbed by coring or natural disturbance. Concave-down bowing of laminae, with mini-faults and small-scale convolutions between laminae. Mainly fine-to-medium dark micaceous sand (0.3-0.7 mm grain size). A few liquefaction flow structures, and delicate folding, cm-scale, between laminae. Dark sands are generally 3-10 mm thick; lighter sandy silty muds are 6-20 mm thick.

63-70.5 cm. Ten, vaguely laminated, dark dispersed fine sand (0.2-0.3 mm grain size; 2-3 mm thick) in a dark silty mud alternating with lighter tan silty mud (3-5 mm thick). Basal dark sandy silty muds are sharp based, some with scalloped ? loaded bases. Some small disturbances and convolutions along laminae (? liquefaction structures or burrowed features) . Lower 3 units are are vaguely graded and laminated internally.

70.5-74 cm. ? Turbidite CE. Irregular top and irregular, loaded and scoured base. Basal 1 cm appears to be rippled, somewhat convoluted, medium sand (0. 5 mm grain size) , alternating with fine sand laminae (0.3 mm grain size), grades into a silty mud with dispersed fine sand (0.3 mm grain size).

74-77 cm. Graded-laminated medium sand to silty mud. Base is sharp, irregular, scalloped ? scoured or convoluted. Unit is very well graded at the base from medium sand (0.5 mm grain size) to fine sand (0.2-0.3 mm grain size). Top 8 mm of bed consists of laminated darker, silty sandy mud lamina alternating withy tan muddy silt.

77-94 cm. Disturbed/ liquefied. Concave-up and concave-down distorted laminae, consisting of alternating tan silty muds with darker fine sands. A prominent white to dark sand band (12 mm thick) occurs at 90 cm. Units are graded from darker basal sands (1-3 mm thick; 0.3-0.5 mm grain size), which grade into lighter silty muds with dispersed fine sand (0.3 mm grain size; thickness 7-12 mm thick). Some convolutions and possible dish structures in the lower 10 cm.

94-96 cm. Graded sand. Lower 4 mm consists of a white to dark sand (quartz, muscovite, biotite) medium to coarse sand size (0.5 - 1.0 mm grain size), which grades into a dark fine to medium micaceous sand (muscovite) (0.3-0.5 mm grain size). The lower white sand has yellow ochre Fe-staining along the upper and lower lamina boundaries.

96-99 cm. Dispersed fine sand in silty mud. Some internal loading or convolution, marked by a bowed-up tan silty clay band, 2 mm thick, overlain and underlain by silty mud with dispersed fine sand (0.3 mm grain size, 3-10 mm thick).

99-102 cm. Disturbed ? Concave-up sand lens of white to dark sand, with yellow, Fe-staining along lens boundaries. Underneath the sand lens are clear dish structures; which are underlain by slight bowed-up (i.e. concave up) laminae of dispersed fine sand in a silty mud (1-2 mm thick), alternating with darker fine-to medium sands (0.3-0.5 mm grain size; 0.5 - 1 mm thick).

102-112 cm. Slightly disturbed, concave-up laminae. Fourteen, graded-laminated light tan silty mud with thin darker sand interlaminae, medium to fine sand size material (0.5-0.3 mm grain size). Light tan sandy silty mud laminae are 3-6 mm thick; darker basal sands of graded couplets are 1-3 mm thick. Slight convolution, faulting or disruption along laminae, ? due to core disturbance.

112-117 cm. Slightly disturbed, concave-up laminae. Thirteen, graded-laminated light tan silty mud with thin darker sand interlaminae, medium to fine sand size material (0.5-0.3 mm grain size). Light tan sandy silty mud laminae are 1-5 mm thick. Darker basal sands of graded couplets are 0.5-1 mm thick.

117-120 cm. Well laminated, graded couplets of openwork dark fine sand (0.3 mm grain size; 0.5-2 mm thick), alternating with dispersed dark fine sand (0.2-0.3 mm grain size) in a silty mud (2-10 mm thick).

120-124 cm. Massive, fine to medium sand (grain size 0.3-0.5 mm). Structureless. Slight Fe-staining.

124-126 cm. Silty tan mud with dispersed fine sand (grain size 0.3-0.5 mm).

CORE: IT0.1 Archive 2/2 LENGTH: 126 cm to 226 cm

Note: Marks on core barrel are incorrect; white tape markings are correct for depth. Basal ~ 20 cm of core (241.5 cm - EOS) is disrupted, ? disturbed by coring and not logged in detail.

126-126.5 cm. Structureless sand, 0.3-0.5 mm grain size. Fine, micaceous, biotite-rich, and quartz.

126.5-127 cm. Graded-laminated sand to silty mud. Irregular, sharp loaded base. Lower 5-7 mm consists of medium, dark micaceous sand, 0.5 mm grain size, which grades up into delicate laminations (mm-scale of fine quartz sand (0.3 mm grain size) dispersed in silty mud, alternating with a more openwork micaceous quartz sand (0.3-0.5 mm grain size).

127-132.5 cm. Silty sand with fine sand interlaminae, one grain thick (0.5 - 1mm grain size) @ 128, 128.5, 129, 130 cm depth. Irregular, ? bioturbated base or loaded @ 132.5 cm depth.

132.5-135.5 cm. Graded-laminated sand to silty muddy sand. At the base the grain size is 0.5 mm, at the top the grain size is 0.3 mm in the 'coarser laminae.' Laminations defined by delicate laminations (mm-scale of fine quartz sand (0.3 mm grain size) dispersed in silty mud, alternating with a more openwork micaceous quartz sand (0.3-0.5 mm grain size). Concentrated, or openwork fine to medium sand partings are 1-2 mm thick; more silty bands with dispersed fine sand are 3-9 mm thick. Possible inverse-to-normally graded 'triplet' at the base @ 135.5 cm depth.

135.5-141 cm. Graded-laminated sand to silty muddy sand. At the base the grain size is 0.3- 0.5 mm, at the top the grain size is 0.25- 0.3 mm in the 'coarser laminae.' Laminations defined by delicate laminations (mm-scale of fine quartz sand (0.25- 0.3 mm grain size) dispersed in silty mud, alternating with a more openwork micaceous quartz sand (0.3-0.5 mm grain size). Concentrated, or openwork, fine to medium sand partings are 0.5 -3 mm thick; more silty bands with dispersed fine sand are 3-10 mm thick. Possible inverse-to-normally graded 'triplet' at the base @ 141 cm depth.

141-143 cm. Graded medium to fine sand to sandy silty mud. Sand concentrated in lower 2-3 mm, grading into a silty mud with dispersed fine sand, 0.3 mm grain size, mainly muscovite. Sharp base.

143-144 cm. Graded fine sand to sandy silty mud. Sand concentrated in lower 3 mm, grading into a silty mud with dispersed fine sand, 0.3 mm grain size, mainly muscovite. Sharp base.

144-149 cm. Graded-laminated sand to silty muddy sand. At the base the grain size is 0.3- 0.5 mm, at the top the grain size is 0.1 mm in the 'coarser laminae.' Laminations defined by delicate laminations (mm-scale of fine quartz sand (0.25- 0.3 mm grain size) dispersed in silty mud, alternating with a more openwork micaceous quartz sand (0.3 mm grain size). Concentrated, or openwork, fine sand partings are 0.5 -1 mm thick; more silty bands with dispersed fine sand are 3-10 mm thick. Sharp, irregular ? loaded, base.

149-152 cm. Graded-laminated sand to silty muddy sand. At the base the grain size is 0.5-1 mm, at the top the grain size is0.3 mm in the 'coarser laminae.' Laminations defined by delicate laminations (mm-scale of fine quartz sand (0.3 mm grain size) dispersed in silty mud, alternating with a more openwork micaceous quartz sand (0.3-0.5 mm grain size). Concentrated, or openwork, fine to medium sand partings are 0.5 -3 mm thick; more silty bands with dispersed fine sand are 3-10 mm thick.

152-154 cm. Graded-laminated sand to silty muddy sand. At the base the grain size is 0.3-0.5 mm, at the top the grain size is 0.2- 0.3 mm in the 'coarser laminae.' Laminations defined by delicate laminations (mm-scale of fine quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand. Concentrated, or openwork, fine to medium sand partings are 1-2 mm thick; more silty bands with dispersed fine sand are 3-6 mm thick. Sharp based.

154-159 cm. Disturbed by coring, small microfaults and concave-up bowing of laminae. Graded-laminated sand to silty muddy sand. At the base the grain size is 0.3-0.5 mm, at the top the grain size is 0.2- 0.3 mm in the 'coarser laminae.' Laminations defined by delicate laminations (mm-scale of fine quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand. Concentrated, or openwork, fine to medium sand partings are 0.5-2 mm thick; more silty bands with dispersed fine sand are 3-6 mm thick. Sharp based.

159-161 cm. Disturbed by coring, with concave-up bowing of laminae. Graded-laminated sand to silty muddy sand. At the base the grain size is 0.3-0.5 mm, at the top the grain size is 0.2mm in the 'coarser laminae.' Laminations defined by delicate laminations (mm-scale of fine quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand. Concentrated, or openwork, fine to medium sand partings are 0.5-1 mm thick; more silty bands with dispersed fine sand are 2-7 mm thick. Sharp based.

161-165.5 cm. Graded-laminated sand to silty muddy sand. At the base the grain size is 0.3-0.5 mm, at the top the grain size is 0.1 mm in the 'coarser laminae.' Laminations defined by delicate laminations (mm-scale of fine quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand. Concentrated, or openwork, fine to medium sand partings are 0.5-1 mm thick; more silty bands with dispersed fine sand are 2-6 mm thick. Sharp based.

165.5- 171 cm. Graded sand to silty mud with dispersed fine sand. Structureless aside from grading. Sand is concentrated in lower 2 cm, grain size 0.3 mm, grades into silty mud with dispersed fine micaceous (muscovite and biotite) quartz sand (grain size 0.1-0.2 mm) at the top. Sharp based.

171-172.5 cm. Graded sand to silty mud with dispersed fine sand. Structureless aside from grading. Sand is concentrated in lower 3 cm, grain size 0.3-0.5 mm, grades into silty mud with dispersed fine micaceous (muscovite and biotite) quartz sand (grain size 0.3 mm) at the top. Sharp based, loaded.

172.5-175 cm. Graded-laminated sand to silty muddy sand. At the base the grain size is 0.3-0.5 mm, at the top the grain size is 0.1 mm in the 'coarser laminae.' Laminations are vague , consisting of fine micaceous quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand. Concentrated fine to medium sand partings are 0.5 mm thick; more silty bands with dispersed fine sand are 2-16 mm thick. Base is gradational and ill-defined.Irregular contact with underlying bed.

175-178 cm. Prominent well-defined, normally graded bed, with pulsating bands of tan/green/grey coloration. Bands are well defined, with gradational boundaries, and most likely represent subtle changes in the size and concentration of the dispersed sand-size material. Basal 7 mm consists of a very well graded, micaceous (muscovite) coarse sand (1mm grain size), which has shape, dewatered/loaded base. The basal sand grades into a slightly darker micaceous medium to fine sand (0.3 mm grain size, to 0.2 mm grain size at the top). Darker, concentrated fine sand partings are 0.5 mm thick; more silty bands with dispersed fine sand are 1-15 mm thick.

178-185 cm. Massive, ? mottled, silty fine sand (grain size 0.2-0.3 mm), A sand parting (1 mm thick; grain size 0.2 mm) @ 183.5 cm depth. Very sharp, irregular, ? loaded base.

185-187 cm. Graded, structureless sand, grain size at base is 0.3-0.5 mm, grain size at top is 0.2 mm. Lower 0.5 cm is somewhat darker, containing slightly more biotite than upper parts of bed.

187-190 cm. Turbidite. CDE ? . Graded, cross-laminated to laminated sand to silty sand. Basal 7 mm has low angle cross-bedding ? 10 to 15 degrees dipping down to the left, overlain by a well-graded/laminated sand/silty sand, toped by 5 mm of silty mud with dispersed fine sand size material. Laminations defined by fine micaceous quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand. Concentrated, or openwork, fine to medium sand partings are 0.5-1 mm thick; more silty bands with dispersed fine sand are 2-13 mm thick. Grain size at base is finer grained (0.2-0.3 mm) in the low-angle crossbeds, increasing to 0.5 mm in the well graded interval, fining to 0.2 mm at the top for the coarser material dispersed in the silty mud. Sharp , irregular ? loaded base.

190-192 cm. Disturbed by coring. Graded-laminated, sand to silty mud with dispersed sand. Darker, concentrated fine sand partings are 2 mm thick; more silty bands with dispersed fine sand are 5-10 mm thick. Grain size at base is 0.3-0.5 mm, at top is 0.2-0.3 mm. Vague base, irregular.

192-195 cm. Inverse-to-normally graded-laminated sand to sandy silty mud. At the base the grain size is 0.2 mm, increasing to 0.5- 1mm 5 mm above base, then decreasing to 0.1 mm dispersed in a silty mud at the top. Laminations are well-defined and confined to the lower cm or so , consisting of fine micaceous quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand. Concentrated fine to medium sand partings are 3-5 mm thick; more silty bands with dispersed fine sand are 2 mm thick. A 'triplet' of inverse-to-normal graded laminations occur at the base. Sharp based.

195-196 cm. Graded, structureless sand to sandy silty mud. Grain size at base is 0.2-0.3 mm; grain size at top is 0.1 mm. Lower 0.5 cm is somewhat darker, containing slightly more biotite than upper parts of bed. Upper part of bed consists of dispersed fine micaceous (muscovite) sand (grain size 0.1 mm) in silty mud. Sharp, irregular ? loaded base.

196-197 cm. Very fine sand (grain size 0.1 mm) dispersed in a silty mud. Very irregular, ? bioturbated, base.

197-198.5 cm. Very well inverse-to-normally graded sand. @ base 0.2-0.3 mm grain size, about 1/2 way up 0.5 mm, decreasing to 0.2 mm at top. Sharp, very irregular ? loaded, base.

198.5 -199 cm. Very fine sand (grain size 0.1 mm) dispersed in a silty mud. Very irregular, ? bioturbated, base.

199-203.5 cm. Well graded-laminated sand to silty muddy sand. At the base the grain size is 0.5-1 mm, at the top the grain size is 0.2 mm in the 'coarser laminae.' Laminations are vague , ~ 1 mm thick, consisting of fine micaceous quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand. Base is sharp, irregular ? loaded.

203.5-209 cm. Graded-laminated sand to silty muddy sand. At the base the grain size is 0.2-0.3 mm, at the top the grain size is 0.1-0.2 mm. Laminations are wispy and discontinuous across the core , consisting of fine micaceous quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand. Concentrated fine to medium sand partings are 3-6 mm thick; more silty bands with dispersed fine sand are 6-10 mm thick. Contacts between wispy laminations are irregular and most likely bioturbated. Sharp base.

209-212 cm. Rippled sand. Cross-bedded scour-fill, with preserved ripple formset at the top. Sand cross-laminae are defined by alternating grain sizes of 0.2-0.3 mm to 0.3-0.5 mm .

212-218 cm. Lower 1/3 of bed convoluted, ? disturbed by coring ??. Inverse-to-normally graded-laminated sand to silty muddy sand. At the base the grain size is 0.3-0.5 mm, increasing to 0.5-1 mm @ 5 mm above base, then decreasing to 0.3 mm at the top. Laminations are wispy and discontinuous across the core , consisting of fine micaceous quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand. Concentrated fine to medium sand partings are 3-6 mm thick; more silty bands with dispersed fine sand are 6-10 mm thick. Contacts between wispy laminations are irregular and most likely bioturbated. Yellow Fe-staining in coarser laminae at base of bed. Sharp base.

218-225 cm. Graded-laminated sand to silty muddy sand. At the base the grain size is 0.3-0.5 mm, at the top the grain size is 0.3 mm. Laminations are very delicate , consisting of fine micaceous quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand partings . Darker, concentrated fine to medium sand partings are < 0.5 mm thick at the base, increasing to 1-2 mm at the top; the lighter more silty bands with dispersed fine sand are 10 mm thick at the base, decreasing to 3 mm thick at the top. The upper third of the bed is ? disturbed, appears to be bent into a 'little triangle' -- does not appear to be a true ripple formset. Sharp base.

225-227 cm. Graded, structureless sand to sandy silty mud. Grain size at base is 0.5-0.3 mm; grain size at top is 0.1 mm. Sharp base.

227-236 cm. Five, graded-laminated sand to silty muddy sands. At the base the grain size is 0.2-0.3 mm, at the top the grain size is 0.1 mm. Laminations are very delicate , consisting of fine micaceous quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand partings . Darker, concentrated fine to medium sand partings are < 0.5 -2 mm thick ; the lighter more silty bands with dispersed fine sand are 3-10 mm thick Sharp bases.

236-239.5 cm. Slight core disturbance, with concave-up bowing of laminae. Well graded-laminated sand to silty muddy sand. At the base the grain size is 0.3-0.5 mm, at the top the grain size is 0.1-0.2 mm. Laminations are well defined in the lower cm or so, , ~ 1 mm thick, consisting of fine micaceous quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand. Overlying laminae are vague, with ill-defined gradational boundaries; bands are ~ 1 cm thick. Base is sharp.

239.5-241.5 cm. Well graded-laminated sand to silty muddy sand. At the base the grain size is 0.3-0.5 mm, at the top the grain size is 0.2 mm. Laminations are well defined , ~ 1-2 mm thick, consisting of fine micaceous quartz sand dispersed in silty mud, alternating with a more openwork micaceous quartz sand. Sharp, irregular bioturbated base.

241.5 - 266 cm. Disturbed by coring. Consists of alternating sands and silty sands . Sands are ~ 0.5 - 1 cm thick; silty sands are a few mm thick. Not logged in detail.

CORE: IT 0.3 Archive 1/4 LENGTH: 0-86 cm.

Note: Core missing where sediment has slumped forward and left a gap @ 32-40 cm depth. Further core disturbance @ 43-48 cm; sand flow-in @ 58-64 cm depth.

0-4 cm. 'Salt and pepper' sand, micaceous (biotite, muscovite) quartz medium to fine sand, slightly silty ?. Grain size mainly 0.2-0.3 mm, rare 0.3-0.5 mm micas. Structureless.

4-42.5 cm. 'Salt and pepper' sand, micaceous (biotite, muscovite) quartz medium to fine sand (rare coarse) , slightly silty. Subtle changes in grain size @ 4-10 cm depth: grain size 0.5-1 mm; @ 10-21 cm depth: grain size 0.5-1 mm quartz, dispersed 1 mm size micas; @ 20-40 cm depth: grain size 0.3-0.5 mm quartz, 0.5-1 mm micas. Structureless. Core slumped forward leaving a gap @ 32-40 cm depth.

42.5-70 cm. Disturbed, slumped @ 43-48 cm, sand flow-in @ 58-64 cm. Tan/grey silt. Structureless.

70-70.5 cm. Coarse micaceous quartz sand, with oriented (parallel-to-bedding) muscovite flakes up to 5 mm long. Structureless.

70.5-86 cm. Ungraded, slightly silty fine biotite, muscovite and quartz sand (grain size 0.3-0.5 mm) with dispersed rounded to distorted clay and/or silt intraclasts (maximum size 2 x 3 cm; minimum: 8 x 0.3 mm).

CORE: IT 0.3 Archive 2/4 LENGTH: 86-172 cm.

86-134 cm. Inverse-to-normally graded sand with deformed intraclasts. Part of same bed at base of Archive 1/4 @ 70.5-86 cm. Lowest 3 cm is very fine sand 0.1 mm grain size, grades to medium to coarse sand 0.5-1.2 mm over the next few cm upsection @ 131-129 cm depth, then fines up to 0.5 mm grain size @ 110 cm depth to 0.5-0.3 mm grain size @ 86 cm depth. Concentration of muscovite and biotite seems more abundant in the lower 3 or 4 cm, where it is inversely to normally graded. No apparent preferred orientation to mica flakes. Deformed silt intraclasts start at 131 cm depth and continue up to 86 cm depth. No preferred orientation -- near random with vertical, oblique to horizontal orientations of clasts.

134-172 cm. Disturbed, sand flow-in along sides of core. Tan/grey silt. Structureless. @ 138 cm. angular dropstone, ~ 2 cm across.

CORE: IT 0.3 Archive 3/4 LENGTH: 172-295 cm.

Note: Top few cm of core has flowed forward and slumped. It is also mildewed. This disturbed sedimenet was removed and core was repacked.

172-295 cm. Liquefied sand (grain size 0.5-1 mm) and silt. ? Naturally occurring. Very convoluted mixture of massive grey/tan silt and medium-fine biotite, muscovite, quartz sand. Appears to be massive flow-in along sides of core, but also has an appearance of original internal homogenization and liquefaction. Few recognizable features:

@ 180 cm depth: angular ? dropstone clast or dispersed clast 3 cm diameter;
@ 185-195 cm depth: irregular fluid escape washed zones and dish structures;
@ 200 cm depth: sharp break or contact between mainly sand above and mainly silt below. Grain size 0.5-1 mm sand;
@ 200-230 cm depth: possible sand flow-in along core margins;
@ 230-245 cm depth: fluid escape tubes of sand in a mainly silty background sediment;
@ 245 cm depth: sandy break.

CORE: IT 0.3 Archive 4/4 LENGTH: 295-430 cm.

295-430 cm. Naturally deformed mixture of contorted silt intraclasts, and sand intraclasts, within a mainly sandy background sediment. Grain size 0.5-1 mm. Apparently ungraded. Deformed intraclasts are 10's of cm long, up to core width across, and are badly convoluted and distorted. Some internal convolute structues @ 335 cm depth, and possible sand-filled fluid escape tubes (?) within a mainly silty background sediment @ 340-355 cm depth.

CORE: IT 0.4 Archive 1/3 LENGTH: 0-70 cm.

0-0.5 cm. Inverse-to-normally graded sand. Basal 1.5 mm is fine sand (0.3 mm grain size) with mainly biotite flakes, overlain by ~ 2 mm of medium (0.3-0.5 mm grain size) quartz sand, topped by ~ 2.5 mm of fine mica flakes (biotite ~ 0.3 - 0.2 mm grain size). Many of the mica flakes are oriented parallel-to-bedding, both at the base and at the top. Sharp based.

0.5-1.8 cm. Massive olive silty mud with dispersed biotite flakes (? only on surface of core, perhaps due to washing of surface associated with dewatering of core).

1.8-2 cm. Slightly disturbed during core splitting. Laminated fine quartz and biotite sand (grain size 0.3 mm for quartz, up to ~ 0.5 mm for biotite). Sharp base and top.

2-5 cm. Structureless, massive yellow tan silty mud.

@ 5 cm. Wispy sand parting, ~ 3 cm across, fine sand size material (0.3 mm grain size) mainly quartz.

5-9 cm. Structureless, massive tan grey silty mud.

9-20.5 cm. Ungraded, fine-to medium size sand, with scattered coarse sand grains (0.3-0.5 mm, rare 1-1.5 mm). Micaceous quartz sand (biotite and muscovite). Large deformed, silty mud intraclast 6-7 cm long x 4 cm wide). Sharp based.

20.5-22.5 cm. Massive structureless silty mud.

@ 22.5 cm. Wispy, fine sand parting, irregular, ? burrow-infills or burrowed remnant of a lamina, fine micaceous sand, with oriented (parallel to bedding) muscovite mica flakes, o.3-0.5 mm diameter.

22.5-25 cm. Vaguely laminated tan/grey silty sandy mud, with wispy fine sand (0.3 mm grain size) breaks @ ~ 1 cm intervals. Basal and top cm are mainly fine sand/silty mud, centre interval (cm or so) is mainly silty mud.

25-26 cm. Disturbed, small microfaults. Normally graded sand to silty mud. Fine sand size material (0.3 mm grain size) concentrated in lower 2-3 mm, overlain by dispersed fine sand in a silty mud. Fairly well sorted, with good distribution grading. Irregular sharp base, ? loaded.

CORE: IT 0.4 Archive 1/3 (Archive)

26-32 cm. Massive tan/grey silty mud with dispersed rust-colored angular granule (1-2 mm across) and 1-cm diameter pebble. Becomes much andier @ 32-33 cm depth. ? possible coarse ice-rafted debris. Very irregular, ? burrowed base.

32-38 cm. Massive tan/grey silty mud with dispersed angular granule (1-2 mm across) and 1-cm diameter pebble-size material (? possible coarse ice-rafted debris). Vague (?) wispy sandy laminae or horizontal burrows. Mainly structureless. Sharp, irregular burrowed base.

38-40.5 cm. Massive, ungraded medium to coarse sand (0.5-1 mm grain size), muscovite, biotite, quartz. Very irregular, ? bioturbated, base.

40.5-50 cm. Light grey tan. Structureless silty mud with dispersed micaceous sand (0.5-0.3 mm grain size) and rare granule, @ 43 cm, and pebble @ 48 cm depth.

50-55 cm. Vaguely banded (cm-scale) grey-tan/yellow mud with wispy sand breaks @ 52 cm, and 54 cm depth of fine micaceous (biotite and muscovite) sand (grain size (0.3-0.5 mm grain size). Wispy sands are sharp based, with irregular, ? burrowed tops. The sand @ 54 cm is mainly preserved now as relict lamination, mainly as burrow infill.

55-64 cm. Massive, structureless, grey/tan silty mud. @ 60.5 -63 cm depth is a large ? burrow infill or a sand ball, 2 cm x 2 cm, comprised of fine-medium sand, and rare granule, 1.5 mm grain size, in the center, surrounded by coarse sand (1 mm grain size) around the margins. Irregular burrowed perimeter.

64-65 cm. Disturbed, Flow-in and "flow-out" structures, fine to coarse sand (0.3-1 mm grain size).

65-70 cm. Disturbed, Flow-in and structures, fine and medium- coarse sand (0.3, 0.5- 1 mm grain size). Some preservation of large, circular, sand-filled burrows, ~ 0.5 - 1 cm in diameter.

CORE: IT 0.4 Archive 2/3 LENGTH: 70-185 cm.

Note: Top part of the core has slumped forward; logged below in the 70-76 cm interval.

70-76 cm. Top disturbed. Medium to coarse (0.5-1 mm grain size)

76-79 cm. Large (? ice-rafted) pebble. Angular, dark igneous rock fragment, ~ 3 cm across. Bows down laminae beneath it (dropstone structures). Set in a sandy silty mud. Vague laminae on the top arch around the top of the pebble. Irregular, loaded base. Some ochre coloration to bent laminae. Basal 0.5 cm is dark micaceous fine-medium sand (0.5-1 mm grain size).

79-80 cm. Slightly silty sand with brownish coloration. Irregular, burrowed base. Fine to medium sand size (0.3-0.5 mm grain size) with a significant silty component.

80-81.5 cm. Graded-laminated (?) sand to silty mud. Vague laminations in basal 0.5 cm. Top cm or so is burrowed with sand-filled burrows (same sediment as in overlying unit @ 79-80 cm depth). Sharp based.

81.5-82 cm. Graded sand to silty mud. Grades from a medium dark brown sandy silty mud, to ~ 1/2 way up into a grey silty mud, with minor dispersed fine sand. Irregular, bioturbated base.

82-83.5 cm. Graded sandy/ silty mud. Wispy fine sand parting @ base. Lenticular sand is traceable 3-4 cm across core. Sediment consists of brown quartz-rich sand, which grades into a grey/brown silty mud. Becomes more clay-rich in upper half. Very sharp base.

83.5-86 cm. Inverse-to-normally graded sandy silty mud. Base consists of a inversely-graded brown sand, lower 1-2 mm is a silty muddy sand, overlain by a coarser medium sand with some silty, which grades into a well-sorted medium sand (next 8 mm). The upper part of this bed consists of a grey silty fine sand with dispersed biotite flakes (up to 5 mm across), the top 0.5-0.8 cm consists of a tan silty clay cap.

86-87 cm. Grey silty/clayey mud with dispersed granules and pebbles 1-2 cm across (? ice-rafted debris), possible sand-filled burrows.

87-88 cm. Inversely-graded brown sand. Lower 1-2 mm consists of a clayey fine sand, which grades to a medium-to-coarse sand at the top. Very sharp based.

88-93 cm. Five, Graded dark sand/silty clay couplets. Each is very sharp based. Dark basal sands are mainly fine sand, less commonly, medium sand sizes. Each is overlain by a grey sandy silty mud with dispersed fine to very fine sand, capped by a brown/tan clayey mud. Sand is brown, micaceous (biotite) quartz sand. Basal sands are 0.5- 6 mm thick; middle sandy silty mud is 2-4 mm thick, and top clay caps are 3-10 mm thick.

93-113 cm. Structureless, medium to coarse (0.5- 1mm) micaceous (muscovite) quartz sand. Sharp based.

113-114.5 cm. Structureless, clayey silty medium sand (0.5 mm grain size), muscovite, biotite, quartz. Poorly sorted. Sharp based.

114.5-118 cm. Inverse graded sand. Grey muddy sand in basal 1-2 cm, becoming more sandy and coarser grained upsection, until it is a very coarse, granular openwork sand at the top 5 mm of the bed. Ochre/brown staining increases upsection, especially in the top 3-4 mm of the bed.

118-130 cm. Disturbed ? natural. Underlying and overlying units are undisturbed. Disturbance is marked by convolutions of laminae, internal flowage of laminae, and possibly dish structures along some of the more contorted laminae. Lenticular/folded to convoluted-laminated sands/silty mud. Silty muds are 0.5-1 cm thick alternating with fine-medium/coarse sand, 4-10 mm thick. Each couplet is normally graded sand-to-silty mud and is sharp based.

130-140.5 cm. Inverse-to-normally graded/laminated sand/silty sand.
Inverse grading occurs in the lower half of the bed, and consists of laminated/convoluted silty sand alternating with fine-medium sand @ base, grading to a central 3-4 cm thick zone of medium/coarse to very coarse quartz sand, which then grades normally to a fine-medium quartz sand at the top 3-4 cm of the bed. Vague liquefaction/convlution in the upper half of the bed. Possible convolution due to folding at the base.

140.5-141 cm. Grey clay, vague laminated at top. Bioturbated base.

141-184 cm. Inverse-to-normally graded sand with internal convolutions and muddier bands which are distorted (? intraclasts). Possible ? grain flow deposit. Light colored quartz sand with heavy minerals diespersed throughout, and scattered muscovite flakes. Sand in coarseest grained in the center @ 154-158 cm depth, consists of medium/coarse-verty coarsae sand. The base and the top are fine-to medium sand size. Perhaps amalgamated flows with slightly shalier convoluted partings @ 148 and 160 cm depth. @ 184 cm there are more muscovite flakes, up to 1-2 mm across, oriented parallel-to-bedding. Clay intraclasts scattered throughout, although slightly more common @ 148, 154-158, 160 and 168 cm depth. Top consists of bent muddy laminae of alternating sandy clays and sands, which dip down to the left at ~ 10-15 degrees. ? folded. Loaded base with prominent flame structures.

184-186 cm. Darker sand with clayey fine to medium sand size material ? small intraclasts.

CORE: IT 0.4 Archive 3/3 LENGTH: 185-325 cm

185-203 cm. Sixteen, Graded-laminated sand to silty muds. Some large scale convolution/ folding in the upper few cm ? natural or core disturbance. Sands are sharp based, mainly medium sand size at the base (5-7 mm thick), grading to a fine to medium sand (3-10 mm thick) , and/or a fine sand dispersed in a silty mud (5-7 mm thick) , with a clay cap (5-7 mm thick). A few of the beds are inverse or inverse-to-normally graded. Many show laminations, especially in the upper half of this unit All are sharp based. Lowest bed has a very convoluted/loaded base @ 203 cm depth.

203-245 cm. Medium to coarse sand with dispersed granule size (few mm across) muscovite and biotite flakes. Large deformed clay intraclasts (2 cm x 6 cm) @ 205 cm depth. Vertical fluid escape tubes, 2-3 cm long x 1-2 mm wide, towards base. Large scale convolute, loaded base.

245-270 cm. Structureless, medium to coarse sand. Ungraded. Loaded base.

270-274.5 cm. Convoluted (loaded from above) laminated sand/ clayey sand. Grey/white/brown clayey sand ~ 10 mm thick, grain size 0.3 mm, alternate with brown/white sand, 2-3 mm thick, grain size 0.5-1 mm.

274.5-325 cm. Mainly structureless, coarse sand (1- 1.5 mm grain size) with vague liquefaction structures, fluid escape tubes and liquefied bands (~ 1 cm wide).

CORE: IT1.1 Archive section AB LENGTH: 0-50 cm.

Note: this interval is disturbed. Slumped forward. Most of core is missing. What is remaining consists of a massive/ structureless grey silty clay.

CORE: IT1.1 Archive section BC LENGTH: 50-185 cm.

50-60 cm. Disturbed. Slumped forward. Most of core is missing. What is remaining consists of a massive/ structureless grey silty clay.

60-100 cm. Massive, structureless, grey micaceous sandy mud, consisting of medium to coarse sand dispersed in mud, with larger granule and pebble size material scattered throughout (? ice-rafted debris). Large clasts are angular, comprised mainly of K-feldspar and dark metamorphic rock fragments.

100-127 cm. Massive, structureless, grey micaceous sandy mud, consisting of medium to fine sand dispersed in mud. Mottled and burrowed, with Fe-staining occurring in burrows.

127-127.3 cm. Sand lens. 3 mm thick x 1/2 of core-width. Dark sand, biotite-rich and a concentration of heavy minerals, Irregular base and top (? burrowed).

127.3-185 cm. Massive, structureless, grey micaceous sandy mud, with dispersed medium to fine sand and less common pebble-size (? ice-rafted) debris @ 148 cm and 172 cm depth. Fe-staining along rims of granular and pebble-size material, and also along margins of a possible burro infill @ 172 cm depth. Coarse debris is angular, mainly quartz and metamorphic rock fragments.

CORE: IT1.1 Archive section CD LENGTH: 185-335 cm.

185-215 cm. Massive, structureless, tan/grey micaceous mud with dispersed fine-to medium sand size particles. Very rich in biotite and muscovite. Vague mottled texture. Some Fe-stained burrows.

215-235 cm. Massive, structureless, tan/grey muddy fine-to medium sand. Very rich in biotite and muscovite. Horizontal sand filled burrows (? Planolites) and oblique to near vertical open burrows, 1 mm diameter and a few mm long. Some Fe-stained burrows.

@ 235 cm. Sand laminae 3-5 mm thick, medium to coarse sand, very angular grains, comprised mainly of dark metamorphic and igneous rock fragments, quartz, mica and K-feldspar. Burrowed top and bottom to sand lens. Some vertical burrows extend upwards a few cm from this sand into the overlying muddy sand.

235-250 cm. Massive, structureless, tan/grey muddy fine-to medium sand. Very rich in biotite and muscovite. Horizontal sand filled burrows (? Planolites) and oblique to near verticval open burrows, 1 mm diameter and a few mm long. . Some Fe-stained burrows.

@ 250 cm. Relict sand lamina, up to 1 cm thick. Extensively burrowed. Horizontal sand-filled burrowed sand, consisting mainly of medium sand size, angular rock fragments, quartz, biotite, muscovite.

250-272 cm. Massive, structureless, muddy sand. Mottled. Sand-filled burrows have oblique and horizontal orientations; a few are near-vertical. Burrow fill consists of medium sand, which is commonly Fe-stained.

272-292 cm. Five, relict sand/mudy sand couplets. Extensively burrowed. Sands are dark, medium to coarse sand alternating with light tan/grey muddy sand. Both bands have irregular tops and bases, mainly burrowed.

@ 284 cm. An abraded bivalve shell fragment dispersed in a sandy mud.

292-320 cm. Massive, structureless, tan/grey muddy fine-to medium sand. Very rich in biotite and muscovite. Horizontal sand filled burrows (? Planolites) and oblique to near verticval open burrows, 1 mm diameter and a few mm long. . Some Fe-stained burrows.

320-335 cm. Three, relict sand/mudy sand couplets. Extensively burrowed. Sands are dark, medium to coarse sand alternating with light tan/grey muddy sand. Both bands have irregular tops and bases, mainly burrowed.

CORE: IT1.1 Archive section DE LENGTH: 335-487 cm.

Note: Core was labelled upside down. This was evident by the "upside" down load casts, convolute lamination, escape burrows, and what appeared to be normally graded intervals. The correct description is given here.

335-354 cm. Remnant sand/ sandy silty mud couplets, extensively burrowed. Basal dark sands are ~ 2 cm thick, overlying lighter grey sandy silty muds are 5-13 cm thick.

354-367 cm. Mottled, clayey mud with dispersed medium to fine sand size material.

367-372 cm. Mottled, silty mud with dispersed medium to fine sand size material. Open burrows very prominent, 1-2 mm across, few mm long, with horizontal and oblique orientations.

372-403 cm. Mottled, silty mud with dispersed medium to fine sand size material.
@ 372 cm. Remnant lamina, dips at a low angle ? 10 degrees down to the left, consisting of medium sand size micaceous quartz sediment. Irregular burrowed base and top.

403-409 cm. Mottled, mud with dispersed medium sand size particles.

409-410 cm. Very coarse sand/ granule sediment. Micaceous, medium to fine sand size quarts; coarse to granular size biotite and muscovite, scatterred small K-feldspar fragements. Irregular burrowed base and top. (? Aeolian).

410-427 cm. Massive, structureless, sandy mud with abundant sand-filled burrows. Burrow infill is medium to coarse sand. Burrows have oblique to horizontal orientations, vaguely defined, 3-4 mm in width and 0.5 - 1 cm in length.

@ 424 cm. ? Ice-rafted dropstone.

427-432 cm. Mottled, silty muddy sand, consisting mainly of medium to coarse sand-size particles, with muddy infill.

432-437 cm. Mottled sandy silty mud, consisting of fine to medium micaceous quartz sand dispersed in a silty mud.

437-462 cm. Massive, structureless, sandy mud with abundant sand-filled burrows. Burrow infill is medium to coarse sand. Burrows have oblique to horizontal orientations, vaguely defined, 3-4 mm in width and 0.5 - 1 cm in length. Sand is more common and slightly coarser grained from 360-365 cm; becomes more silty >365-380 cm.

462-476 cm. Massive, structureless, tan/grey mottled muddy sand with dispersed fine sand size particles. Fe-stained burrows.

476-487 cm. Massive, structureless, tan/grey mottled muddy sand with dispersed fine sand size particles. Fe-stained burrows.
@ 487 cm. Relict sand lamina, 1 cm thick, extensively burrowed.

CORE: IT1.1 Archive section EF LENGTH: 487-641 cm.

487-493 cm. Tan/grey mottled sandy mud, with dispersed fine-sand size material.
@ 490 cm. Scattered bivalve shell debris.

493-495 cm. Disturbed, bowed-up by coring. Medium sand size, quartz, muscovite, scattered K-feldspar grains. Sharp, irregular, burrowed base and top. Fairly well sorted (? aeolian).

495-558 cm. Mottled, sandy silty mud with (? dropstone) pebble @ 562 cm, ~ 1 cm. diameter, angular quartz fragment. Fe-stained burrrows, 1/2-2 mm in diameter, oblique to horizontal orientations. Some are sand-filled, others are infilled with sandy silty mud. Scattered angular, quartz granules (2-3 mm grain size).

@ 540-550 cm. Slightly less sandy and a few more granules.

558-570 cm. Normally graded-laminated sand to clayey mud. Basal 1 cm consists of openwork, quartz-rich sand. Irregular, burrowed base. Gradually grades into a medium sand-size quartz rich sediment @ 565 cm becomes more silty to clayey, @ 563 vague convoluted laminations of alternation more clay-rich and silty mud layers. Near the top becomes more bioturbated with clay-infilled horizontal Planolites burrows and horizontal to vertical oxidized Fe-stained burrows.

570-585 cm. Normally graded sandy mud, consisting mainly of scattered micaceous sand in a silty clayey mud. Near the top and in the upper half it is more bioturbated, with clay-infilled horizontal Planolites burrows and oblique burrows. Grading is well developed in lower cm or so, grading from a coarse sand to a more dispersed fine-to medium size sand in a silty mud. Above this, grading is not so well developed. Very sharp, irregular loaded base.

585-641 cm. Mottled sandy silty mud, becomes more silty @ 610 cm depth; from 585-610 cm depth is more dispersed micaceous sand. Burrows are horizontal Planolites and Thalassinoides. Other oblique burrows, 1-2 mm diameter, few mm to cm long.

@ **599 cm.** Angular ? dropstone pebble.
@ **600 cm.** Burrow density decreases to about half of what it is in this zone, all Planolites. Scattered angular granules.

CORE: IT1.1 Archive Section FG LENGTH: 641-793 cm.

641-666 cm. Structureless, tan sandy silty micaceous mud with dispersed fine sand particles in a mainly greenish/grey silty mud. Scattered Fe-stained oxidized burrows, in fairly low density.

666-668 cm. Normally graded tan sandy silty mud.Irregular sharp base (? burrowed). Pure quartz and muscovite sand, 1-2 mm thick, grades into a silty sandy mud, with scattered medium to coarse sand in silty mud. A few Fe-stained oxidized burrow infills.

668-672 cm. Normally graded tan sandy silty mud to greenish grey silty mud. Well developed normal grading in basal cm or so, consisting of coarse to very coarse micaceous (muscovite) sand, which grades into medium sand in the next cm, to scattered fine to very fine sand in a silty mud at the top. Starting ~ 1/2 upsection are a few Fe-stained burrow infills. Irregular, bioturbated base.

672-688 cm. Normally graded tan sandy silty mud to greenish grey silty mud. Well developed normal grading in basal cm or so, consisting of coarse to very coarse micaceous (biotite and muscovite) sand, which grades into medium sand in the next cm, to scattered fine to very fine sand in a silty mud at the top. Starting ~ 1/2 upsection extensive Fe-stained burrow infills. @ 673 cm. medium-coarse sand-filled burrow, sediment brought down from overlying bed. Irregular, bioturbated base and top to lower sandy interval of bed.

688-793 cm. Structureless, mottled sandy silty mud with orange Fe-stained mottles, with apparently random orientations. Vague horizontal mottling or remnant lamination of tan silts @ 700 cm depth. Vertical sand-filled ? Skolithos burrow, and irregular compound burrows 3-5 mm wide x3-4 cm long @ 760-764 cm depth. Otherwise mainly structureless, micaceous (biotite and muscovite) medium to coarse quartz sand scattered in a tann/ greenish grey silty mud. In the lower 1/2 of the bed burrows are less dense, 1-2 mm wide x 1 cm long with random orientations.

CORE: IT1.2 Archive Section 1/5 LENGTH: 0-104 cm.

Note: Top 4-5 cm has dried out and slid forward in the type, logged with 0-14 cm interval. Repacked. Top 30 cm of core has sand that has washed onto surface of core associated with dewatering of core.

0-14 cm. Light micaceous (mainly biotite, some muscovite) quartz sand, fairly well sorted. Medium to coarse sand size material. Structureless and ungraded. Sharp, flat base.

14-22 cm. Light micaceous (mainly biotite, some muscovite) quartz sand, fairly well sorted. Slightly higher %age of darker grains than in overlying bed. Fine to medium sand size material, up to coarse size for some individual mica flakes. Structureless and Ungraded. Sharp, irregular (scoured 2.5 cm into underlying bed) base.

22-25 cm. Light grey, silty clayey mud. Massive. Irregular base.

25-104 cm. Wispy-laminated sands alternating with sandy mud. Sands are lenticular, irregular lenses, ~ 5 mm to 1.5 cm in height and traceable for 3-4 cm across the core. Bases of the sands are sharp, generally irregular, loaded or scoured, into underlying units. Tops of sands are also very irregular, bioturbated. Internally, sands are structureless. Overlying muds show some vague lamination, with more clayey or sandy laminae 0.5-0.3 mm thick. Background sandy muds are brown to grey; sands are quite light in coloration and comprised mainly of biotite, muscovite, quartz and dark heavy minerals. Normally graded couplets occur throughout this zone, and are most notable @ 56.5-104 cm, in which there are six stacked normally graded units.

CORE: IT1.2 Archive Section 2/5 LENGTH: 104-228 cm

104-105 cm. Structureless, fine sandy/ silty mud. Sharp even base.

105-113.5 cm. Normally graded sand to muddy silty sand. Lower 2 cm all sand, coarse to very coarse sand size (a few 5 mm mica flakes), mainly quartz, biotite, muscovite, and heavy minerals, next 5 mm is medium to fine micaceous quartz sand with heavy minerals, which grades into a medium to fine micaceous sand dispersed in a silty mud. Irregular, burrowed or loaded base.

113.5-116.5 cm. Bioturbated/mottled dispersed fine to medium micaceous sand in a silty mud. Some of the sand occurs as burrow infills, 2-3 mm wide x few cm long, dipping down at about 10 degrees to the left ? burrowed relict cross-bedding. Irregular bioturbated base.

116.5 - 119 cm. Bioturbated/mottled sandy, silty clayey mud. Mottle infills are medium to coarse sand; background sediment is a medium to fine sand dispersed in a silty clayey mud. Very irregular, diffuse upper and lower contacts. ? remnant base of normally graded bed, which extended up to 113.5 cm depth. Very irregular, bioturbated/loaded base.

119-121 cm. Dispersed sand in a silty mud. Lacks the sand-filled mottles of the overlying unit, and is slightly less sandy than the interval 116.5 - 119 cm depth. Sharp but irregular base -- not bioturbated, seems to drape over coarser clasts which are sticking up above the general bed level of the underlying bed.

121-137 cm. Graded-stratified arkosic conglomerate. Some flowage along the left side of the core down to 143 cm depth. Very well graded-stratified openwork conglomerate. Stratification is defined by more openwork gravels (5-45 mm thick) , alternating with more closework sandy gravels (5-40 mm thick). Stratification thickness decreases from ~ 40-45 mm at the base to 5 mm at the top. Clasts are mainly angular quartz (many yellow Fe-stained clasts), feldspar (?plagioclase), K-feldspar, dark biotite clasts, muscovite and some heavy minerals toward the base. Much of the very coarse debris is comprised of very angular plagioclase and K-feldspar fragments. Within the stratification bands, the coarse clasts have a random orientation. Irregular, scoured base or flowage along sides of core (6-7 cm down into underlying bed).

137-169 cm. Vaguely stratified muddy sands alternating with sands. ? Remnant graded beds, bioturbated. The muddy sand intervals consist of fine-to medium micaceous sand (biotite and muscovite) dispersed in a brown/tan silty mud. The sandier intervals have a slightly higher concentration of micaceous sand. Mottles defined by slightly more oxidized irregular zones. Irregular, burrowed base.

169-179 cm. Four, normally graded sands to sandy silty muds. 'Salt and pepper' micaceous (biotite and muscovite) quartz sand concentrated in the lower 0.5-2 cm, overlain by 3-5 mm thick dispersed medium to fine micaceous sand in a silty muddy sand. In the upper two beds there is a noticeable concentration of heavy minerals in the base of the beds. Upper parts of the beds are bioturbated. Irregular, loaded or bioturbated bases.

179-181 cm. Ungraded, structureless medium to coarse sand. Biotite, muscovite, quartz. Irregular, bioturbated base and top of bed.

181-186.5 cm. Graded-laminated sand to silty muddy sand. Micaceous (biotite and muscovite), quartz sand, with a few Fe-stained (ochre colored) quartz sand grains. The lower 2.5 cm consists of concentrated sands, 0.5-1 mm grain size, overlain by 1.5 cm of a silty fine to medium sand, grain size 0.5 mm. topped by a laminated, dispersed fine to medium sand in a silty mud. Irregular, bioturbated base and top of bed.

186.5-193.5 cm. Bioturbated sands (~1- 3 cm thick) alternating with silty fine to medium sands ((~ 1-3 cm thick). Appear to be separate beds, as opposed to graded-couplets. Irregular, bioturbated, bases and tops separate the sands and silty sands. The sands are 'salt and pepper' muscovite, biotite, quartz sands, average grain size 0.5 mm; the silty sands consist of slighter finer biotite, muscovite and quartz, 0.5-0.3 mm grain size, with a silty matrix.

193.5-196 cm. Graded sand. The basal 1.5 cm consists of a dark medium to coarse micaceous sand (0.5-1mm grain size), with large biotite and muscovite flakes and quartz. Mica flakes are oriented parallel-to-bedding. This grades into a lighter fine to medium sand (grain size 0.3-0.5 mm grain size), comprised mainly of quartz with some muscovite and a slightly silty matrix infill. Irregular loaded base.

196-200 cm. Inverse-to-normally graded/laminated sand. The basal cm ofor so consilts of 'sheared' silty fine-medium sands (? slumped), grain size 0.5-1 mm for coarser clasts dispersed in the silt. This grades into a laminated micaceous sand, inwhich the lamination is defined by aligned biotite flakes, orientated parallel-to-bedding, grain size varies from 0.3-0.5 mm, and laminations vary from 1.0 - 0.3 cm thick, decreasing in thickness upsection. Top cm or so consists of silty fine sand, with vague lamination and dispersed mica flakes in a mainly silty fine sand background. Irregular, convoluted and loaded base.

200-210 cm. Four, graded sands to (silty) fine sands. Concentrated sands in the lower 2-4 mm of a bed, overlain by more dispersed micas in a fine sand or a silty fine sand background. Grain size at the base is 0.5-1 mm; towards the top is 0.3-0.5 mm. Irregular, loaded/flamed bases, some of which show orientated biotite flakes outlining the convolutions of the flame structures.

210-211.5 cm. Mottled silty fine sand, 0.5-0.3 mm grain size dispersed in a silty background. Irregular base and top.

211.5-213 cm. Graded-laminated sand. Laminations are 2-6 mm thick, defined by dark biotite rich sands alternating with white quartz bands. Somewhat disrupted ? mottled. Grain size in the lower 0.4 cm is 0.5-1 mm; at the top the grain size is 0.3-0.5 mm. Within the dark laminae, the biotite flakes are well oriented, parallel-to-bedding. Sharp base.

213-222 cm. Mottled, silty fine-to medium sands, with scattered coarse mica grains dispersed throughout. Amalgamated, ? three graded beds. Extensively bioturbated. Coarser relict sand laminae and/or burrow infills up to 0.6 cm thick @ 216, 219 and 222 cm depth.

222-228 cm. Graded-laminated sand. Laminations are 2-6 mm thick, defined by dark biotite rich sands alternating with white quartz bands. Grain size in white bands is 0.5-1 mm; in the dark bands the grain size is 0.3-0.5 mm. Within the dark laminae, the biotite flakes are well oriented, parallel-to-bedding. Sharp base.

CORE: IT1.2 Archive Section 3/5 LENGTH: 228-370 cm.

228-228.5 cm. Structureless, grey/tan silty mud.

228-232.5 cm. Normally graded sand. Basal 2 cm white, quartz sand, 0.5-1 mm grain size, with some muscovite; upper part more micaceous, biotite and muscovite, medium to fine sand, 0.5-0.3 mm grain size. Some heavy minerals concentrated toward base. Sharp base.

232.5-244.5 cm. Tan/grey wispy-laminated, silty muddy sand. Mainly 0.5-0.3 mm grain size, muscovite, biotite and quartz. More concentrated, wispy sands, 3-5 mm, grain size 0.3-0.5 mm @ 235,236.5, 239, 241.5, 244.5 cm. depth. Irregular loaded base.

244.5-248 cm. Medium to coarse sand (grain size: 0.3-0.5, to 1 mm). Appears to be liquefied. Irregular, convoluted base and top.

248-357 cm. Massive, structureless sand, with possible vertical fluid escape tubes, and 'washed-out' liquefied zones. Little systematic variation in grain size. Mainly medium to coarse (0./5-1 mm grain size) or medium to fine sand size (0.5-0.3 mm). Somewhat coarser/finer patches or bands versus slightly more 'silty' looking sands, but not well defined. Mica flakes are scattered throughtout with a random orientation.

@285 cm. Broken bivalve shell.

357-370 cm. Normally graded sand. Grain size 0.75-1 mm at base. to 0.3 mm at top. Very well developed distribution grading. Sharp base.

CORE IT 1.2 Archive Section 4/5 LENGTH: 370-488 cm.

Note: top cm, from 370-371 cm, appears to be a clay cap, due to elutriation and dewatering from the core, and not an original clay band. Above this clay the core barrel is very dark and reduced. The colors of the core are a light tan/grey grey from 370-421 cm; from 421 to 488 cm, somewhat darker brown reflecting a higher concentration of sand, and a lower concentration of silt.

371-378 cm. Fine to medium micaceous (biotite, muscovite) quartz sand, grain size 0.3-0.5 mm. Micas dispersed throughout. Vague irregular, silty patches and zones. ? due to dewatering of surrounding sediment, or due to mottling and infill of silty patches.

378-382 cm. Coarse micaceous (biotite, muscovite) quartz sand, grain size 0.5-1 mm, some as fine as 0.3 mm. Poorly sorted. Micas dispersed throughout. Vague irregular, silty patches and zones. ? due to dewatering of surrounding sediment, or due to mottling and infill of silty patches.

382-399 cm. Fine micaceous (biotite, muscovite) quartz sand, grain size 0.3 mm. Micas dispersed throughout. Vague irregular, silty patches and zones. ? due to dewatering of surrounding sediment, or due to mottling and infill of silty patches.

399-421 cm. Silty muddy fine-medium sand, 0.3-0.5 mm grain size, dispersed mica flakes (biotite and muscovite) in a quartz sand.

@405-407 cm. Abraded shell debris.

421-478 cm. Vague, alternating bands of more openwork sand (2-5 mm thick) and silty muddy sand (3-5 mm thick). Vague, irregular boundaries between bands ? convoluted due to dewatering. Openwork patches are slightly coarser grained, 0.5 mm grain size; otherwise fine-to medium sand (0.3-0.5 mm grain szie) dispersed in a silty muddy matrix.

478-488 cm. Normally graded sand, from 0.5 mm grain size at the base, to 0.25-0.3 mm grain size at the top. Well developed distribution grading. Biotite, muscovite and quartz sand.

CORE IT 1.2 Archive Section 5/5 LENGTH: 488-624 cm.

Note: Top 10 cm of dry, loose sand in core has slid forward. Repacked and relabelled. Core is very dry, dessicated, cracked, and very fragile.

488-498 cm. Disturbed. Slid forward and remolded. Structureless, fine to medium micaceous sand, 0.5-0.3 mm grain size.

498-551 cm. Liquefied sand with deformed clay intraclasts. Internally quite disturbed, with internal convolutions, load structures, dish structures, fluid escape tubes, sand injections, and deformed clay intraclasts. Very gradual grading: 0.5-1 mm grain size @ 548-542 cm dpeth, 0.5- 1 mm grain size @ 520 cm depth; 0.5-0.3 mm grain size @ 498 cm depth.

@ **498-499 cm.** Clay ball, 2.5 cm x 1 cm. Rounded.
@ **499-506. cm.** Dish structures, fluid escape tubes, and overall liquefied appearance.
@ **506 cm.** Clay ball, 1.5 cm long x 1 cm wide. Slightly rounded.
@ **512-520 cm.** Deformed clay balls, the width of the core x 8 cm long.
@ **520-530 cm.** Clay balls with sand injections, or sand with deformed clay intraclasts.
@ **530 cm.**? ? Amalgamation band between two liquefied units.
@ **530-540 cm.** Deformed clay intraclast with sand injections.
@ **542-548 cm.** Silt intraclast (6 cm high x 2 cm wide) and well developed dish structures, and thin elutriation, liquefied bands @ base.

551-592 cm. Normally graded sand, from 1 mm quartz grain size and 1.5-1.3 mm biotite flakes at the base, to 0.5-0.3 mm grain size at the top. Well developed distribution grading. Biotite, muscovite and quartz sand. The biotite flakes at the base have a random orientation in the lower 10 cm or so. ? slight silty break at 570 cm depth ? amalgamation of units. Sharp base.

592-595 cm. Disturbed, with microfaulting of laminae. (? natural or core disturbance) Stratified micaceous sand and silt. Graded-laminated stratification bands, 8 mm thick. Bases marked by excellent alignment of biotite flakes, parallel-to-bedding (grain size 0.5-1 mm; thickness 2 mm), grading into 0.5-0.3 mm quartz and feldspathic sands dispersed in a silty mud with vague lamination (thickness 6 mm). Sharp, flat bases.

595-624 cm. Normally graded sand, from 1 mm quartz and biotite flakes at the base, to 0.5 mm grain size at the top. Well developed distribution grading. Biotite, muscovite and quartz sand. The biotite flakes at the base have a random orientation. @ base is are possibly deformed silty clay intraclasts, or deformed silty clay material which has flowed-in during coring.

CORE: IT2.1 Archive Section 1/2 LENGTH: 0 -119 cm.

0-43 cm. Normally graded sand. Very well developed distribution grading from very coarse sand at the base to medium to fine sand at the top. Quartz rich sand, with some biotite, muscovite and K-feldspar. Grains are subrounded, rounded and angular. At the base is a muddy sand intraclast, 1 cm in diameter. A few scattered muddy-granule intraclasts occur at 32 and 38 cm depth. @ 25 cm depth, white sand lamina, dipping at about 10 degrees down to the left. Sorting within individual sections of core is well developed. Very sharp base.

43-47 cm. Normally graded (? laminated) sand. Very well developed distribution grading from very coarse sand at the base to medium sand at the top. Quartz , biotite, muscovite grains, some heavy mineral grains. Muddy, 1 mm thick cap before next bed (? elutriation of fines due to dewatering of core, or a natural amalgamation surface). Possible ? lamination @ 43 cm marked by slightly darker sand grains (more heavies and biotite flakes) and a more openwork texture. Irregular, scoured or loaded base, cuts downsection a few cm into underlying unit.

47-55 cm. Normally graded sand, from coarse to very coarse sand in the lower 3 cm, to medium to fine sand sizes in the upper few cm. Quartz, K-feldspar and mica. Irregular, ? bioturbated base.

55-90 cm. Ungraded very coarse to coarse sand. Poorly sorted. micaceous, quartz sand with some K-feldspar. Possible amalgamated beds. Slightly muddier breaks ~ 1 mm thick @ 62 cm (? possible burrow infill), @ 90 cm, muddier silty lamina ~ 3 mm thick. @ 70 cm possible cross-stratification, 1-3 mm thick, of white sand, alternating with slightly muddier lamina, 1-2 mm thick, all dipping at about 10 degrees down to the left.

90-104 cm. Normally graded sand, from very coarse sand to granular at the base in the lower 5 cm, to coarse sand sizes in the next few cm, and slightly coarse-to-medium sand at the top.Although there is grading within the bed, it is mainly coarse-tail grading, with most of the core intervals being very poorly sorted at a given core depth. Quartz, K-feldspar and mica. Slightly muddier, burrowed break 3-5 mm thick, @ 90 cm depth. ? Amalgamation surface.

104-119 cm. Ungraded coarse sand. Very poorly sorted. Quartz, muscovite, and K-feldspar. Some irregular muddier zones, ? burrows/mottles or due to infiiltration and waterwashing of fines from the sides of the core.

CORE: IT2.1 Archive Section 2/2 LENGTH: 119-249 cm.

119-141 cm. Slightly, normally graded sand. Quartz, K-feldspar, minor muscovite. Coarse to medium sand at base; medium sand at top.

141-175 cm. Ungraded sand with deformed intraclasts. Very coarse sand size mainly quartz grains. Large deformed intraclasts, comprised of green/grey silt , up to 10-12 cm long x 2-3 cm wide. Vertical and oblique orientations to intraclasts, which themselves are quite convoluted and ? folded.

175-250 cm. Ungraded granule sand with rounded intraclasts. Intraclasts are 1-2 cm in diameter and subrounded to well rounded and are concentrated in groups or bands of 4 or 5 in a row @ 191 cm, 125-130 cm, 140 cm, with single occurrences @ 148 cm and 151 cm depth. ??Amalgamation of beds.

CORE: IT2.2 Archive Section AB (1/6) LENGTH: 0-75 cm.

0-8.5 cm. Tan/grey graded sand to sandy silty mud. Dispersed fine-medium sand, 0.3-0.5 mm grain size, with scattered 1 mm biotite flakes in a silty mud. @8-8.5 cm depth more concentration of biotite and muscovite-rich quartz sand, 0.5-1 mm grain size.

8.5-18.3 cm. Tan/grey graded sand to sandy silty mud. Dispersed fine-medium sand, 0.3-0.5 mmm grain size, with scattered 1 mm biotite flakes in a silty mud. @18-18.3 cm depth more concentration of oxidized, ochre brown/orange quartz sand, 0.5-1 mm grain size.

18.3-46 cm. Tan/grey graded sand to sandy silty mud. Dispersed fine-medium sand, 0.3-0.5 mmm grain size, with randomly scattered 0.5-1 mm biotite flakes in a silty mud. @46 cm depth more concentration of dark quartz sand, 0.5-1 mm grain size, muscovitte, biotite and quartz. Scattered oxidized burrow infill throughout this unit. Sandy infill is 0.5 mm grain size; burrows are 2-3 mm wide x few cm long, oblique to horizontal orientations. Some of the burrows are open.

46-74 cm. Sandy silty mud. Dispersed fine-medium sand, 0.3-0.5 mmm grain size, with scattered 0.5- 1 mm biotite flakes in a silty mud. Somewhat higher concentration of burrows, 1-2 mm wide 'pinholes' randomly scattered throughout; others are 2-3 mm wide x cm long with horizontal and oblique orientations.

CORE: IT2.2 Archive Section BC (2/6) LENGTH: 75-229 cm.

74-92.5 cm. Graded sand to sandy silty mud. @ 87-92.5 cm depth coarse to very coarse sand, @ 89 cm depth rounded igneous rock fragment, 1.5 cm across. Very poorly sorted base. @ 85-87 cm depth, biotite muscovite medium quartz sand, 0.5-0.75 mm grain size; top is fine to medium sand, 0.5-0.3 mm grain size, dispersed in a silty mud. Scattered oxidized sand-filled burrows, 1-2 mm across x few cm long in upper part of bed.

@ **76 cm**. Broken shell fragments, 0.5 mm grain size.

92.5-98 cm. Graded sand to sandy silty mud. @ 98-101 cm depth very poorly sorted, disorganized, coarse to very coarse sand with deformed intraclasts. Irregular burrowed base. Burrows 1-2 mm wide, 1-2 cm long @ 95-98 cm grain size 0.5 mm; @ 92.5-95 cm fine to medium sand, 0.5-0.3 mm grain size, dispersed in a silty mud. Scattered oxidized sand-filled burrows, 1-2 mm across x few cm long in upper part of bed.

98-174 cm. Six, graded-bioturbated silty sandy mud with sand partings. Remnant graded beds, comprised mainly of 0.5 mm (rarely 1-2 mm) sand at the base and o.3-0.5 mm sand at the top dispersed in a silty mud. Bases are irregular, burrowed and/or loaded. Lower parts of individual units show a slightly higher concentration of sand, and the intensity of bioturbation decreases slightly. Burrows are in general, 1-2 mm in diameter. The lower halves of beds are mainly burrows with horizontal, oblique and vertical orientations. Identifiable types are Planolites and Thalassinoides. Upper parts of beds have more of the round, 'pinhole' types of burrows, 1 mm in diameter. Beds range from 8- 21 cm thick.

174-181 cm. Burrowed sandy silty mud. Grain size consists of 0.5-0.7 mm quartz grains, 0.7- 1 mm mica flakes, with random orientations. Oxidized burrows, 1-2 mm across x 0.75 - 1 cm long, mainly an oblique orientation.

181-229 cm. Mottled silty sand, o.5 - 1mm grain size. Few scattered definable burrows, mainly vague mottled zones. Scattered burrows are 1-2 mm wide x 0.75 - 1 cm long, oblique to horizontal orientations.@ 174-181 cm oxidized sand infill. No apparent changes in grain size.

CORE: IT2.2 Archive Section CD (3/6) LENGTH: 229-384 cm.

229-241 cm. Mottled silty sand, o.5 - 1mm grain size. Few scattered definable burrows, mainly vague mottled zones. Scattered burrows are 1-2 mm wide x 0.75 - 1 cm long, oblique to horizontal orientations.@ 174-181 cm oxidized sand infill. No apparent changes in grain size.

@ 231 cm. ? Dropstone, 1.5-2 cm, subrounded; 1 cm long, angular.
@236-240 cm. ? Dropstone, > 6 cm long, subrounded.

241-384 cm. Ten, graded-bioturbated silty sandy mud with sand partings. Remnant graded beds (few cm to 10 cm thick) , comprised mainly of 0.5 mm (rarely 1-2 mm) micaceous sand at the base ; 0.3-0.5 mm sand at the top dispersed in a silty mud. Bases are irregular, burrowed and/or loaded. Lower parts of individual units show a slightly higher concentration of sand, and the intensity of bioturbation decreases slightly toward the base. Burrows are in general, 1-2 mm in diameter, ~ cm long with mainly oblique to horizontal orientations. Many of the burrow infills are oxidized.

@ 260-268 cm. Disrupted-lamination does not appear to be solely disrupted due to bioturbation. Appears to have almost 'flowed' between laminae, consisting of ~0.5 cm alternations of sand and silty sandy mud.

@ 272.5 cm. Skolithos vertical burrrow, 1-2 mm wide x 2 cm long; overlain by Planolites burrows and possible Chondrites.

@ 301-305 cm. Burrowed, irregular pocket of well sorted sand. Irregular, bioturbated base and top. Very well sorted, micaceous quartz sand 0.5 mm grain size. Ungraded internally. (? remnant aeolian sand).

CORE: IT2.2 Archive Section DE (4/6) LENGTH: 384-537 cm.

384-537 cm. Bioturbated, dispersed fine sand in a silty mud. Mainly structureless. With oxidized orange/brown burrows, 1-2 mm in diameter, circular, oval to a few cm long. A few more sandy breaks and laminae, suggest that this interval may represent relict graded beds.

@ 415-480 cm. Burrowed, irregular pocket of well sorted sand. Irregular, bioturbated base and top. Very well sorted, micaceous quartz sand 0.5 mm grain size. Sand lens slopes at ~ 15 - 20 degrees down to the right. Ungraded internally. (? remnant aeolian sand).
@ 435-444 cm. Rhizocorallium and Terbellina trace fossils.
@ 458-459 cm. Thalassinoides traces.

480-490 cm. Inverse-to-normally graded sand. Basal cm consists of a white quartz sand, with some muscovite, 0.5 mm grain size, which grades into a dark medium to coarse grained (0.5-1 mm grain size) micaceous (biotite, muscovite) quartz sand, which becomes a medium sasnd at the top (0.5 mm grain size). Irregular bioturbated top. Sharp, irregular loaded base.

490-494 cm. Normally graded sand. Concentrated, dark micaceous (biotite) quartz sand, grain size 0.5 mm, grading into a dispersed medium sand (0.5 mm grain size) in a silty mud. Irregular, bioturbated top. Sharp flat base.

494-522 cm. Bioturbated, dispersed fine sand in a silty mud. Mainly structureless. With oxidized orange/brown burrows, 1-2 mm in diameter, circular, oval to a few cm long. A few more sandy breaks and laminae, suggest that this interval may represent relict graded beds.

@ 509.5 - 510.5 cm. Burrowed, irregular pocket of well sorted sand. Irregular, bioturbated base and top. Very well sorted, dark micaceous (muscovite and biotite) quartz sand 0.5-1.3 mm grain size. Ungraded internally. (? remnant aeolian sand).

522-526 cm. Normally graded sand. Concentrated, micaceous, feldspathic (K-feldspar) angular quartz sand (grain size 1-3 mm) grading into a dark micaceous sand (quartz and biotite) (0.5 - 0.3 mm grain size) in a silty mud. Irregular, bioturbated top. Sharp loaded base.

CORE: IT2.2 Archive Section EF (5/6) LENGTH: 537-686 cm.

537-686 cm. Bioturbated, dispersed fine sand in a silty mud. Mainly structureless. Oxidized orange/brown burrows, 1-2 mm in diameter, circular, oval to a few cm long. Sandy breaks and laminae indicate that this interval represents relict graded beds.

@ 540 cm. Graded sand parting. Sharp base, gradational top. In lower 0.5 cm grain size is 0.5 mm concentrated, grading to a 0.5-0.5 mm dispersed in a silty mud.

@562-563.5 cm. Graded-laminated coarse to medium sand. Grain size is 0.5 - 1 mm at base; 0.5 mm at top. Lamination is defined by aligned mica flakes, oriented parallel-to-bedding. Irregular bioturbated base.

@565-567 cm. Inverse-to-normally graded sand parting. Sharp base, gradational top. In lower 0.5 cm grain size is 0.3 mm concentrated, grading to a 0.5-0.1 mm, capped by 0.3-0.5 mm dispersed in a silty mud. Quartz, K-feldspar, some muscovite.

@ 581-586 cm. Inverse-to-normally graded-laminated sand and silt. In basal 0.5 cm, grain size is 0.3-0.5 mm, grading to 1-3 mm in next 1.5 cm, which decreases progressively to 0.3 mm dispersed in a silty mud ~ 0.5 cm from top, capped by an upper silt unit. Laminations are 7-15 mm toward base, 0.5-1 mm thick toward top, and defined by alternating, sometimes internally normally graded sand-to-silt interlaminae, or alternating sands and silts. Irregular loaded base.

@600-606 cm. Inverse-to-normally graded-laminated sand and silty sand . In basal 0.6 cm, grain size is 0.3-0.5 mm, grading to 1-3 mm in next 0.5 cm, which decreases progressively to 0.3 mm dispersed in a silty mud ~ 0.5 cm from top. Laminations are 5-8 mm thick and defined by alternating, concentrated sands versus sands dispersed in a silt. Irregular loaded base.

@607-608 cm. Ungraded, massive, micaceous sand, 0.5-0.7 mm grain size. Irregular bioturbated base and top.

@628-629 cm. Ungraded, massive, micaceous sand, 0.5-0.7 mm grain size. Irregular bioturbated base and top.
@ 634 cm. Abraded bivalve shell fragment, 5 mm across.
@665-667 cm. Ungraded, massive, micaceous sand, 0.5-0.7 mm grain size. Irregular bioturbated base and top.

CORE: IT2.2 Archive Section FG (6/6) LENGTH: 686-802.

686-END OF CORE. Bioturbated, dispersed fine sand in a silty mud. Mainly structureless. Oxidized orange/brown burrows, 1-2 mm in diameter, circular, oval to a few cm long. Sandy breaks and laminae indicate that this interval represents relict graded beds.

@ 689.5-694 cm. Graded-laminated granule/ very coarse to fine sand. Grain size is 1-3 mm at base; 0.1 mm at top. Lamination is defined by more dispersed fine sands in silty breaks. Irregular scoured base.

@701 cm. Wispy-sand parting, 3 mm thick X 3 cm wide, dark micaceous quartz sand, 0.5 mm grain size. Bioturbated.
@709 cm. Wispy-sand parting, 3 mm thick X 3 cm wide, dark micaceous quartz sand, 0.5 mm grain size. Bioturbated.

@ 717-720 cm. Graded- convolute- laminated granule/ very coarse to fine sand. Grain size is 1-4 mm at base; 0.1 mm at top. At the base are very well sorted, aligned biotite flakes, oriented parallel-tobedding. Vague convolute lamination is defined by more dispersed fine sands(0.3 mm grain size) in silty bands. Internal load/ convolute structures. Irregular scoured base.

@720-723 cm. Burrowed, irregular pocket of well sorted sand. Irregular, bioturbated base and top. Very well sorted, micaceous quartz sand 0.5 mm grain size, micas 1-1.5 mm. Ungraded internally. (? remnant aeolian sand).

@727 cm. Bioturbated sand parting. Inversely graded, quartz sand, 0.3-0.5 mm at base, grading to 0.5-1 mm in next cm or so. Irregular, bioturbated base and top.

@743 cm. Bioturbated sand parting. Ungraded, micaceous quartz sand, 0.3-0.5 mm. Irregular, bioturbated base; flat top.

@750 cm. Bioturbated sand parting. Ungraded, micaceous quartz sand, 0.3-0.5 mm. Irregular, bioturbated base; flat top. Lens is only a couple cm across.

@765 cm. Sand-infilled burrows. Micaceous quartz sand, 0.3-0.5 mm.

@783 cm. Disturbed. Bowed-up by coring. Bioturbated sand parting. Inversely-to-normally graded, micaceous quartz sand, 0.3-0.5 mm in lower 2 mm , grading to 0.5 mm yellow stained quartz in 0.5 cm, topped by 0.3-0.5 mm micaceous quartz sand. Sharp base.

@789-790 cm. Bioturbated sand parting. Ungraded, micaceous quartz sand, 0.3-0.5 mm. Irregular, bioturbated base and top.

@801-802 cm. Bioturbated sand parting. Ungraded, micaceous quartz sand, 0.5-1 mm. Irregular, bioturbated base and top. Lens is only a few cm across.

CORE: IT2.3 Archive Section 1/6 LENGTH: 0-84 cm.

0-5.5 cm. Disturbed by coring. Light greenish/tan silty mud with dispersed fine to medium sand, 0.3-0.5 mm grain size.

5.5-29 cm. Massive, structureless, fine to medium sand, 0.3-0.5 mm grain size, dispersed in a silty mud. @ 14-18 cm. sand-filled burrows, with concentrated 0.5 mm dark micaceous (biotite) sand. Burrows are Planolites, 3-5 mm wide x 2-3 cm long horizontal burrows, scattered , 1-2 mm diameter 'pinhole' burrows, and orange, oxidized quartz sand infilled burrows, 1-2 mm wide x 1 cm long.

29-32.5 cm. Normally graded sand. Irregular burrowed top. Lower 0.5 cm consists of 0.5-1 mm dark micaceous sand (biotite-rich) with heavy minerals, and aligned biotite flakes, oriented parallel-to-bedding. This grades into a ligher, 0.8 cm thick, muscovite and quartz sand, 0.5- 1 mm grain size for the mica, 0.3 mm grain size for the quartz. The top consists of 0.3-0.5 mm quartz, rare 1 mm micas, dispersed in a silty mud. Sharp scoured base.

32.5-37.5 cm. Inverse-to-normally graded sand.Lower 0.5 cm consists of 0.3 mm micaceous sand dispersed within a silty mud. This is overlain by a concentrated sand lamina (0.3-0.5 mm grain size), which grades into a lighter, muscovite and quartz sand, 0.5- 1 mm grain size for the mica, 0.3 mm grain size for the quartz. The top consists of 0.2 mm quartz, rare 0.5-1 mm micas, dispersed in a silty mud. Sharp, irregular bioturbated/loaded base.

37.5-39 cm. Disorganized coarse to very coarse sand. Ungraded. 0.5-1.5 mm grain size. Quartz, biotite, some muscovite and heavy minerals. Apparently random orientation to grains. Irregular loaded/bioturbated base.

39-41 cm. Wispy-laminated/ normally graded sand to sandy silty mud.Wispy concentrated sand, 0.3 mm grain size, biotite and quartz, in lower 0.5 cm, overlain by dispersed 0.3-0.5 mm quartz and mica grains in a silty mud. Normal grading is slightly developed and shown more by an increase in the percentage of silty. Few, scattered, l mm diameter, circular 'pinhole' burrows. Sharp, flat base.

41-59 cm. Bioturbated massive silt with scattered sand infilled mottles (0.3-0.5 mm grain size). Orange oxidized pinhole burrows, 1 mm diameter, to horizontal and oblique burrows, 1-2 mm wide x 1 cm long. A few open burrows.

59-63.5 cm. Bioturbated massive silt with scattered sand infilled mottles (0.3 mm grain size). Orange oxidized pinhole burrows, 1 mm diameter, to horizontal and oblique burrows, 1-2 mm wide x 1 cm long. A few open burrows. Oxidized, wispy sand lenses (burrowed remnants) @ 61.5, 63.5 cm depth).

63.5-84 cm. Massive silty sand, grain size 0.5 mm. Dark micaceous wispy sand @ 73.5 cm (grain size 0.5 mm concentrated); slightly siltier @ 73.5-75 cm depth. Possibly amalgamated units ??.

CORE: IT2.3 Archive Section 2/6 LENGTH: 84-233 cm.

84-86 cm. Disturbed. Top 2 cm has slumped forward. Dispersed 0.3-0.5 mm sand in a silty mud. Irregular bioturbated base.

86-233 cm. Bioturbated sandy silty mud. Dark micaceous (biotite and muscovite) quartz sand, 0.3-0.5 mm grain size, dispersed in a silty mud. Orange oxidized burrows scattered throughout, 1-2 mm in diameter, oval , or 1- 2 mm wide x 0.5-0.8 cm long mainly horizontal Planolites, or less commonly oblilque orientations.

@ 129- 136 cm. Slightly more concentrated sand and coarser grain sizes, 0.5-1 mm
@ 136-137 cm. Disorganized sand, 0.3-1 mm grain size, quartz, muscovite, biotite. Very poorly sorted. Irregular, loaded base.
@148-150 cm. Slightly more concentrated biotite-rich quartz sand, 0.5 mm grain size, remnant base of a bed.
@154-156 cm. Normally graded dark micaceous sand. Lower cm or so consists of biotite-rich quartz sand, 0.3-0.5 mm grain size, which grades into fine sand, 0.3 mm grain size, dispersed in a silty mud. Irregular, ? bioturbated base and top.
@161-170 cm. Burrows are more common and larger, 1-3 mm wide x 2-3 cm long and appear to be composite burrows, some with spreiten. Orange oxidized burrows, possibly Muensteria.
@198-209 cm. Burrows again increase in size, 1-3 mm wide x 2-3 cm long and appear to be composite burrows, some with enlarged galleries, up to a cm across. Oblique and horizontal orientations.

CORE: IT2.3 Archive Section 3/6 LENGTH: 233-383 cm.

233-383 cm. Bioturbated sandy silty mud.Fine quartz sand, 0.3 mm grain size, dispersed in a silty mud. Orange oxidized burrows scattered throughout, 1-2 mm in diameter, circular to oval 'pinholes', or 1- 2 mm wide x 1-2 cm long mainly horizontal Planolites, or less commonly oblilque orientations. rare coarse sand infills , up to 1 mm grain size, @ 243-245 cm depth.

@ 240 cm. Convolute/folded sand, dispersed to concentrated laminae, 0.5 mm grain size.
@ 290-294 cm. Slightly sandier, 0.5 mm in a o.3 mm sand background.
@320 cm. Remnant lamination, ~ 0.5 mm sand concentrated, alternating with 0.3-0.5 mm sand dispersed in silts; laminations 0.3-0.5 cm thick.
@ 346-346.5 cm. Remnant base of a graded bed. Wispy Inverse-to-normally graded/laminated sand. Lower 0.5 cm consists of sand, 0.2 mm grain size, which is overlain by 1-1.5 mm grain size in a band 2-3 mm thick, topped by 0.3 mm grain size sand in a 1-2 mm thick band.

CORE: IT2.3 Archive Section 4/6 LENGTH: 383-540 cm.

383-540 cm. Bioturbated sandy silty mud.Fine quartz sand, 0.3 mm grain size, dispersed in a silty mud. Orange oxidized burrows scattered throughout, 1-2 mm in diameter, circular to oval 'pinholes', or 1- 2 mm wide x 1-2 cm long mainly horizontal or, less commonly, oblique orientations.

@ 389.5 cm. Sand parting, 0.3 mm concentrated sand, Irregular, bioturbated, sharp base. Flat top. Dark micaceous (biotite) quartz sand.
@397-399 cm. Vertical sand-filled Skolithos burrow, 1-2 mm wide x 2 cm long.
> 450 cm. Burrow density decreases slightly.
@ 508 cm. Wispy-laminated sand, 0.5 mm grain size. Mottled.

CORE: IT2.3 Archive Section 5/6 LENGTH: 540-690 cm.

540-690 cm. Sandy silty mud. Fine quartz sand, 0.3 mm grain size, dispersed in a silty mud. Orange oxidized burrows scattered throughout, 1-2 mm in diameter, circular to oval 'pinholes', or 1- 2 mm wide x 1-2 cm long mainly horizontal or, less commonly, oblique orientations. Sharp-based , concentrated sand partings indicate that there are many remnant 'graded beds' which have been homogenized through bioturbation.

@550-500.5 cm. Sand, wispy-laminated. Irregular bioturbated base and top, grain size 0.3-0.5 mm.
@560-562 cm. Sand, wispy-laminated. Irregular bioturbated base and top, grain size 0.2 mm.
@564-568 cm. Normally graded sand. Grain size in lower cm is 0.5- 1 mm micaceous sand, in next few cm is 0.3-0.5 mm , which then grades into a o.3 mm fine sand dispersed in a silty mud.Irregular bioturbated base.
@571-572 cm. Normally graded sand. Grain size in lower 0.5 cm is 0.3-0.5 mm sand , which then grades into a o.3 mm fine sand dispersed in a silty mud. Irregular scoured base.
@580-580.3 cm. Sand parting, grain size 0.2-0.3 mm, dark biotite-rich quartz sand.

595-596.5 cm. Inverse-to-normally graded-laminated sand. Base consists of quartz sand, 0.2-0.3 mm grain size, rare micas 0.5 mm grain size, grading into quartz 0.5-1 mm grain size within 0.5 cm upsection, which then decreases to 0.2-0.1 mm sand in a silt at the top. Laminations, 2-3 mm thick, are defined by alternating concentrated sand/ dispersed sand in silt.

596.5-604 cm. Bioturbated, dispersed fine sand 0.3-0.5 mm in a silty muc.

604-609 cm. Normally graded sand to sandy silt. Lower 1.5 cm consists of very coarse sand/granule, 0.5-2 mm grain size, which grades into a medium to fine sand (0.3-0.5 mm grain size), topped by a fine sand (0.2-0.3 mm grain size) dispered in a silty mud. The grains within the basal zone have a disorganized to chaotic orientation. Above, the coarse base are scattered, 1-2 mm diameter, 'pinhole burrows". Irregular, bioturbated base.

609-615 cm. Normally graded-laminated sand to silty mud. Lower cm consists of fine to medium sand, 0.3-0.5 mm grain size, which grades into a laminated/ medium to fine sand (0.3-0.5 mm grain size), topped by a fine sand (0.2-0.3 mm grain size) dispered in a silty mud. The grains within the basal zone have a disorganized to chaotic orientation, and are mainly yellow-stained quartz. . Laminations in the next band are marked by aligned biotite flakes, oriented parallel-to-bedding. In the dispersed sandy silty zones are first 1-2 mm diameter, 'pinhole burrows", which towards the top are replaced by Chondrites burrows. Irregular, bioturbated base.

615-690 cm. Mottled, silty sandy mud. Dispersed 0.3-0.5 mm mica and quartz sand in a silty mud. Orange oxidized burrows, irregular forms, 1-5 mm diameter.

@634-635 cm. A few vertical burrows (? Skolithos) 1-2 mm diameter x 1 cm long, in a sand parting, 0.3-0.5 mm grain size, micaceous sand.

@646.5 cm. Inverse-to-normally graded coarse sand to granule to sand bed. Dark biotite-rich quartz sand, with some muscovite. Some of the quartz grains are yellow-stained, oxidized. Lower cm consists of 0.3-0.5 mm quuartz grains, which grade into the next 0.6 cm into the granule-micaceous sand, grain size 0.5-2 mm, which ten grades into medium to coarse sand at the top, 0.5-1 mm grain size. Very irregular, bioturbated base and irregular top.

CORE: IT2.3 Archive Section 6/6 LENGTH: 690-840 cm.

Note: Core has slid about 3 cm @ 793.5 cm, with a gap.

690-840 cm. Bioturbated silty sandy mud. Scattered 0.2-0.3 mm micaceous quartz sand. Irregular, oxidized burrows and mottled zones throughout. Where definable, burrows are 1-2 mm in diameeter, 0.5-1 cm long. Sand partings indicate that there was most likely originally normally graded beds which have become obliterated through bioturbation.

@ 699 cm. Sand parting, 12-3 mm thick, grain size 0.3-0.5 mm biotite and quartz sand.
@ 699.5-707 cm. Dispersed biotite flakes, 0.5-0.7 mm grain size.
@732-733 cm. Sand infilled burrows, grain size 0.5- 1mm, micaceous sand, up to 5 mm thick. ? Remnant lamination.
@756 & 800 cm. Sand infilled burrows, grain size 0.5- 1mm, micaceous sand, up to 8 mm thick. ? Remnant lamination.

CORE: IT3.1 Archive Section 1/4 LENGTH: 0-140 cm.

Note: Top cm or so and lower 1-2 cm of this section have slumped.

0-1 cm. Grey. Silty medium sand, 0.5-0.3 mm grain size.

1-3.5 cm. Graded sand to silty sand. Lower cm is 0.5 mm grain size, graded into a silty mud at the top with dispersed very fine sand, 0.1 mm grain size.

3.5-4.5 cm. Graded sand to silty sand. Lower cm is 0.3 mm grain size, graded into a silty mud at the top with dispersed very fine sand, 0.1 mm grain size. Irregular, bioturbated base.

4.5-5 cm. Graded sand to silty sand. Lower 3 cm is 0.3 mm grain size, graded into a silty mud at the top with dispersed very fine sand, 0.1 mm grain size. Irregular, bioturbated base.

5-6.5 cm. Massive, structureless sandy silty mud, with 0.2-0.3 grain size dispersed in a silty mud.

6.5-10 cm. Graded sand to silty sand. Lower 2 cm is 0.3-0.5 mm grain size, graded into a silty mud at the top with dispersed very fine sand, 0.2-0.3 mm grain size.

10-12 cm. Massive, structureless sandy silty mud, with 0.2-0.3 grain size dispersed in a silty mud.

10-140 cm. Massive, structureless grey sandy silty mud, with 0.2-0.3 grain size dispersed in a silty mud. Some vague sedimentary structures:

@30 cm. Vague , wispy (3 cm across core, 0.5 cm thick) sand parting, concentrated sand 0.3-0.5 mm grain size.
@57-60 cm. Vague , wispy (2 cm across core, 0.5 cm thick) sand parting, concentrated sand 0.3-0.5 mm grain size.
@47-50, 53-58, 60, 68-70, 78-100 cm. Few scattered open 'pinhole' worm traces, 0.5-1 mm diameter, up to 3-5 mm long. Various random orientations.
@100-110 cm. Slightly more sands, concentrated 0.3-0.5 mm grain size.
@130 cm. Relict cross-bedding or deformed stratification. 1.5- cm thick sand lens, at a 15-20 degree dip down to the right. Ungraded internally, irregular base and top (? bioturbated).

CORE: IT3.1 Archive Section 2/4 LENGTH: 140-253 cm.

140-253 cm. Very firm compact grey sandy silty clay. Structureless. Dispersed 0.3-0.5 mm sand in a silty mud. A few recognizable open 'pinhole' traces, 1-2mm diameter x 0.5 cm long. A few recognizable strucutres:

@180 cm. Wispy sand laminae, 0.5 -2 cm thick, alternating with silty mud, grain size of sand laminae: 0.5 mm.

@185-205 cm. Slightly sandier, consisting of slightly more concentrated fine to medium sand 0.3-0.5 mm in a silty mud.

@205-213 cm. Sand percentage decreases, mainly a silty mud.

@213-230 cm. Slightly normally graded sand, dispersed 0.3-0.5 mm in a silty mud at base, grading to 0.2-0.3 mm in a silty mud at the top. Coarse-tail grading.

@235-237 cm. Vague, graded sand-to-silt couplets, each ~ 8 mm thick.

@239 cm., 241 cm. Sand partings, grain size 0.3-0.5 mm concentrated.

> 241 cm- 253 cm. Sand percentage decreases, mainly a silty mud.

CORE: IT3.1 Archive Section 3/4 LENGTH: 253-377 cm.

Note: Top 10 cm has slumped forwad. Laminae are bowed-up, Disturbed.

253-377 cm. Mainly vaguely graded-laminated sand-to-silty sand-to-silt. Consists mostly of 0.2-0.3 mm sand dispersed in a silty mud.

@253-255 cm. Well defined dark sand -to- light grey silt couplets. Basal dark sands are sharp based, 2-3 mm thick, which grade into silts 3-6 mm thick.

@269, 274, 276-279, 281-284.5 cm. Concentrated sand partings, comprised mainly of white quartz sand, with a minor amount of muscovite, in partings generally 2-3 mm thick (rarely 5 mm thick @ 274 cm), grain size is 0.3-0.5 mm fine to medium sand.

@290-295 cm. Coarse sand-infilled burrow, 1-2 mm wide x 5 mm long with an oblique orientation, sand infill is up to 1 mm grain size. Horizontal Planolites burrows, 2-3 mm wide x f 1-2 cm long.

@295-303 cm. Concentrated low-angle cross-bedded sand partings alternating with dispersed fine to medium sand in a silty mud.Coarser partings are comprised mainly of tan- white micaceous quartz sand, with a minor amount of muscovite, in partings generally 0.5-1 cm thick, grain size is 0.3-0.1 mm fine to coarse sand. Laminae dip at about 10 degrees down to the left -- does not appear to be due to core disturbace. The basal lamin @303 cm has an irregular, loaded base and is a well graded lamina, into dispersed fine-to-medium sand (0.3-0.5 mm grain size) in a silty mud.

@311-317 cm. Graded-sand to silty mud couplets. Couplets are a few cm thick, consists of a concentrated fine to medium sand (0.3-0.5 mm grain size), grading into a dispersed fine sand in a silty mud, each capped by a thin silty break. Sharp-based lamina.

@328, 330 cm. Two, micaceous sand, each 1.5 cm thick, grain size 0.5 mm, well sorted. Internally are ungraded. Irregular burrowed bases and irregular (? burrowed) diffuse tops (? reworked aeolian sands).

@332.5-335 cm. Normally graded-laminated sand to silty fine sand. Basal few mm consists of a concentrated 0.3 mm grain size micaceous sand, which grades into a silty fine micaceous quartz sand (0.3-0.5 mm grain size). Vague sand/silt convolute lamina in the upper 5 mm. Sharp , irregular base.

@340, 341, 342 cm. Sand infilled Planolites burrows, 5 mm thick; grain size very coarse to coarse sand.

@344-348 cm. Well defined dark sand -to- light grey silt mud couplets. Basal dark sands are sharp based, 2-3 mm thick (rarely 8 mm thick @ 348 cm depth) , which grade into silty muds 2-5 mm thick (most are 5 mm thick) . The lowest couplet has an irregular, bioturbated base; others have sharp flat bases.

@352-356 cm. Normally graded-laminated sand to silty fine sand. Basal few mm consists of a concentrated 0.3-0.5 mm grain size micaceous sand, which grades into a silty fine micaceous quartz sand (0.2-0.3 mm grain size). Sharp , irregular loaded base.

@358, 362, 365, 367 cm. Concentrated sand partings, comprised mainly of white quartz sand, with a minor amount of muscovite, in partings generally 2-3 mm thick (rarely 5 mm thick @ 274 cm), grain size is 0.3-0.5 mm fine to medium sand. Muscovite, quartz and K-feldspar grains.

CORE: !T3.1 Archive Section 4/4 LENGTH: 377-459 cm.

377-459 cm. Mainly structureless silty mud. Few scattered oxidized, ochre-colored ? mottled or burrowed zones. Identifiable traces are 1-3 mm wide, oval to circular, some are up to a cm long, horizontal ? Planolites. Vague lamination is defined by darker, muddy breaks, as follows:

@378 cm1mm thick, darker clayey muddy break
@380.5 cm 3 mm thick, darker clayey muddy break
@ 390 cm1 cm thick, darker clayey muddy break

@398, 413, 415, 416, 425, 427, 430.5, 432, 434, 438 cm. Fine sand partings, 3-5 mm thick, grain size mainly 0.3 mm, appear to be bases of normally graded lamina. Many have irregular, sharp (?loaded) bases.

@438-450 cm. Vague banded, ? graded silty fine sand (3-10 mm thick) alternate with fine sand dispersed in a silt (9-14 mm thick).

@450-459 cm. Massive, dispersed very fine to fine sand ,0.1-0.2 mm grain size, in a grey silty mud.

CRUISE: 85062 CORE: IT 62-20D Archive LENGTH:34 cm

NOTE: Core disturbed by coring, consists mainly of laminated sand or silty sand alternating with silty mud. Colours of bands are 10YR 6/2 grey tan silty sandy mud; oxidized patches of 10YR 6/8 to 7.5 YR 5/6 and 7.5YR 5/8.

0-5 cm. Flowed (Disturbed by Coring) sand/silty sand. Laminated burrowed to bioturbated sand "laminae remnants" alternating with light sandy muds. The laminae occur in graded couplets of a lower grey silty fine sand to very fine sand (0.5 to 10 mm thick) grading upward into lighter tan silty /sandy mud (7 - 15 mm thick) with dispersed fine sand to very fine sand-size material. Grain size of basal sands is 0.5 to 1 mm.

5-8 cm. Well-laminated dark micaceous sand (biotite rich) and silty sands alternating with silty/sandy muds with dispersed fine sand to very fine sand-size material. The laminae occur in couplets, consisting of a lower grey bioturbated sand (generally 1- 2 mm thick, rarely up to 5 mm thick), grading up into a ligher tan silty mud with dispersed fine sand to very fine sand-size material (2 - 9 mm thick). Bases of some of the coarser sand laminae are loaded. Grain size of basal sands is 0.5 to 1 mm.

8-15 cm. Disturbed (Flow-In Structure). Graded-laminated dark sands alternating with tan-grey silty muds, with dispersed very fine to fine sand size material (grain size of dispersed sand is 0.3 - 0.5 mm). Grain size of coarse dark (biotite-rich) sands is 0.5 - 1 mm. Thickness of laminae are quite distorted due to convolution associated with flow-in.

15-22 cm. Bioturbated grey sandy laminae alternating with bioturbated/mottled tan laminae. These laminae appear to be what once were graded-laminated dark sands alternating with tan-grey silty muds, with dispersed very fine to fine sand size material (grain size of dispersed sand is 0.3 - 0.5 mm). Individual laminae are difficult to discern due to the near complete homogenization due to bioturbation. Remnant laminae are marked by differing coloration and intensities of bioturbation. The darker basal sand laminae are generally 1-2 mm thick (grain size 0.5 - 1 mm) and extensively bioturbated. These basal sands grade into tan silty muds with dispersed sand-very fine sand-size material, which is less extensively bioturbated. Basal sands are ~ 1mm thick; overlying siltier bands are 0.5 - 1 cm thick.

22-34 cm. Disturbed. Graded-laminated couplets of dark micaceous sands (biotite-rich) (2-15 mm thick; grain size: 0.5 - 1.5 mm) alternating with tan silty mud (4 - 7 mm thick; grain size: 0.5 - 1 mm) dispersed in a silty mud.

CRUISE: 85062 CORE:IT 62-20B Archive LENGTH:94 cm

The upper half of the core consists of graded-laminated sand-silty sand/ mud couplets. The grey tan silty sandy mud is 10YR 6/2, with oxidized patches of 10YR 6/8 to 7.5 YR 5/6 and 7.5 YR 5/8. The darker basal sands at the base of the couplets are 10YR 3/1 to 10YR 3/2. Some disturbance in the upper 18 cm and lower 4-5 cm of the core -- mainly bowing-up of laminae due to downdrag along the sides of the core barrel.

0-17 cm. Bioturbated, graded-laminated couplets of dark micaceous sands (biotite-rich) (5-10 mm thick; grain size: 0.5 - 1.5 mm) alternating with tan sandy silty mud (11-30 mm thick) Grain size: 0.5 - 1 mm sands dispersed in a silty mud. Bases of couplets are sharp, irregular and burrowed.

17-18 cm. Four, well-laminated couplets of alternating dark silty fine sand (0.3 - 0.5 mm grain size; 0.5 - 1 mm thick) and lighter fine sand (0.3 - 0.5 mm grain size) dispersed in silty mud layers (2-3 mm thick).

18-21 cm. Mottled light tan-grey silty mud. Burrows are vaguely defined, no recognizable types due to the intense bioturbation. Remnant sand "lamina" at 20 cm depth, fine to medium sand (0.3 - 0.5 mm grain size) occurring as horizontal burrow infills.

21-28 cm. Mottled, vaguely laminated couplets of alternating dark silty fine sand (0.3 - 0.5 mm grain size; 2-7 mm thick) and darker brown/orange silty mud layers (1-1.5 mm thick). Basal 1.8 cm consists of a graded (?) bioturbated/mottled silty mud with vague sandy oxidized, horizontal burrow infills (? remnant sandy lamination).

28-54 cm. Well-laminated graded-couplets of sand-to-fine sand-to- silty sandy mud. Colors are more green/grey in color in comparison to upper 28 cm of core. Here, darker grey/black sands 5Y 4/2 alternate with finer sandy silts 5Y 5/2 to 5Y 5/3. The finest silty mud tops are more greyish in color 5Y 6/3. From 28 - 48 cm depth, the laminae are somewhat better preserved consisting of basal dark silty sands, fine to medium sand size material (grain size: 0.5 mm; lamina thickness 1-5 mm thick), grading into the overlying finer sands (0.3-0.5 mm grain size; lamina thickness 1-3 cm thick). The lighter upper parts of the couplets are in general slightly burrowed, but not extensively mottled. At 48 - 54 cm, mottling becomes more intense, with only remnants of 5 or 6 couplets preserved. At 52- 53 cm depth, sandy burrow infills occurr at about a 10 degree angle down to the right, and may possibly be "remnant low-angle cross-bedding."

54-64 cm. Mainly dispersed very fine sand (0.3 mm grain size) in predominantly a silty mud, with bands of 1-2 mm diameter open burrows and a couple of graded sands at the base. The burrows occur as small "pinholes" aligned in horizontal bands, and occur in slightly more sandy zones, ? marking remnant bases of couplets (?). These occur at 56.5 cm, 58 cm, 60 cm, 61 cm, 62 cm and 64 cm depth. The overlying more silty muds are 1-2 cm thick, mainly structureless, with only the mottles and burrows being discernable.

64-68 cm. Burrowed, graded-laminated sand-to silty sand-to silty mud intervals. The laminae are normally graded, consisting of basal coarse to medium dark,m biotite-rich sands (0.5 - 1 mm grain size; 3 - 10 mm thick), grading into mottled tan silty mud with dispersed very fine sand-size grains (0.3 mm grain size; 6 - 8 mm thick). Bases of couplets are irregular, loaded and burrowed.

68 -72 cm. Five, inversely graded-laminated silty mud to sands. Sharp- based, light tan silty mud with dispersed fine sand (grain size 0.3-0.5 mm; laminae thickness 2-5 mm), grading up into a dark, biotite-rich, concentrated fine to coarse sand (0.3 - 1 mm grain size, laminae 3-6 mm). Very little bioturbation, mainly structureless aside from inverse-grading.

72-83 cm. Mainly dispersed very fine sand (0.3 mm grain size) in predominantly a silty mud, with bands of 1-2 mm diameter open burrows and a couple of graded sands at the base. The burrows occur as small "pinholes" aligned in horizontal bands, and occur in slightly more sandy zones, ? marking remnant bases of couplets (?).The overlying more silty muds are 1-2 cm thick, extensively mottled.

83-94 cm. Disturbed by coring. Mottled. Sands (0.5 mm grain size; ? 1-3 mm thick) alternating with sandy silty muds (5-7 mm thick).

CHAPTER 10

DESCRIPTIONS ET ESSAIS GEOTECHNIQUES EFFECTUES SUR DES ECHANTILLONS PROVENANT DU FJORD DE CAMBRIDGE, TERRE DE BAFFIN, CANADA

PAR

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1. INTRODUCTION

Le présent rapport a pour but d'exposer brièvement les essais effectués, la méthode utilisée et le taitement de données fait par Anne Masson (assistante de recherche), sur les échantillons récoltés par Jacques Locat, dans le fjord de Cambridge (Terre de Baffin) lors de l'expédition 85-03 du H.M.S. PANDORA-PISCES IV.

La majorité des essais ont été réalisés à Bedford, près de Halifax N-E, dans les laboratoires du IOB (Institut d'Océanographie de Bedford) avec la collaboration, entre autres, de M. Charles Schafer.

Les échantillons ont été obtenus à l'aide de l'échantillonneur LEHIGH de l'IOB. L'échantillonneur de 2.5 mètres de long et de 10.2 centimètres de diamètre a été modifié par l'ajout d'un panier digité à la base devant retenir l'échantillon. Cet ajout nous apparaît néfaste pour les sols argileux puisqu'il permet la taille du sol à un diamètre réduit. Ceci a pour effet d'annuler la succion de la valve lors de la remontée et aussi la friction (ou l'adhésion) le long du tube d'échantillonnage. Lors de la prochaine campagne nous nous proposons d'effectuer des essais sans le panier.

On trouvera au tableau 1 les détails des échantillons testés et à la figure 1 la localisation des sites d'échantillonnage.

2.ESSAIS EFFECTUES

Les essais effectués sur les échantillons de Cambridge sont les suivants:

-Teneur en eau à l'état intact
-Teneur en eau à l'état remanié
-Résistance à l'état intact (cône suédois)
-Résistance à l'état remanié (cône suédois)
-Céléromètre (ondes P et S)

Tous les essais sauf celui au céléromètre ont été réalisés selon les normes ASTM et BNQ.

3.METHODE

Le matériel récolté dans chacun des tubes (ayant entre 100 et 160 cm de longueur) a été subdivisé, au fur et à mesure, en longueurs de 15 à 20 cm sur lesquelles une tranche d'environ 3 cm d'épaisseur était utilisée pour faire les essais. Chaque fois que cela était nécessaire, l'échantillon en cours d'essai était enveloppé dans un papier "saran" pour éviter qu'il ne s'assèche. Notons aussi que les échantillons ont tous été sortis des tubes dans le même sens qu'ils y sont entrés.

La première étape consistait en une description de la carotte d'argile, notant principalement les variations d'une section à l'autre. Cette description faite, on commence la série d'essais par la mesure de la teneur en eau à l'état intact, suivi des mesures au cône suédois à l'état intact et faites au sommet de la tranche. En raison du temps limité, seulement une série de 5 mesures a été prise au lieu de deux séries (procédure habituelle). La tranche est ensuite remaniée énergiquement pour faire l'essai de résistance à l'état remanié, en prenant soin de conserver une partie de la tranche pour faire l'essai au céléromètre. Ici encore, une série de 5 mesures au cône suèdois est prise et, l'essai terminé, l'argile remaniée est placée dans un sac de plastique pour être conservée. Finalement, les mesures au céléromètre, pour l'onde S, ont été effectuées en plaçant deux épaisseurs de papier filtre des deux côtés de l'échantillon pour minimiser l'effet de la saturation en eau des échantillons et ainsi faciliter la lecture à l'oscilloscope. Les mesures pour l'onde P ont été prises sans papier filtre puisque ces ondes sont transmises par l'eau et donc, à toutes fins pratiques, c'est la vitesse de l'onde dans l'eau qui est mesurée.

Si possible, lorsque tous les essais sont completés, la section d'une quinzaine de centimètres est paraffinée. Le paraffinage est constitué de deux couches de papier "saran" et deux couches de cire d'abeille (ou d'un mélange de paraffine et de vaseline) en alternance, en commençant par le "saran". Les échantillons trop mous, ou qui présentaient des difficultés particulières, sont conservés dans des sacs de plastique.

Les résultats de tous les essais sont présentés au tableau 2. On trouvera en annexe la description des échantillons.

4.TRAITEMENT DES DONNEES

Dans une première étape, tous les calculs de teneurs en eau, de résistances (états intact et remanié), de sensibilité et des vitesses des ondes P et S ont été effectués et compilés au tableau 2. Les relations utilisées sont les suivantes:

Teneur en eau (%):

$$\frac{(\text{masse de sol humide}) - (\text{masse de sol sec}) \text{ X } 100}{(\text{masse de sol sec})}$$

Résistance (kPa): τ_c ou $\tau_c' = 98\ K\ (Q/P)$

où: τ_c(kPa) = Résistance au cisaillement non drainé, à l'état intact

τ_c'(kPa) = Résistance au cisaillement non drainé, à l'état remanié

Q (g) = Masse du cône

P (mm) = Pénétration du cône

K = Cte reliée à l'angle du cône:

0.1 pour un angle de 30 degrés

0.03 pour un angle de 60 degrés

Vitesse des ondes (m/s): $\frac{(\text{épaisseur de l'échantillon})}{(\text{temps de propagation})^{(1)}}$

Ces données ont ensuite été utilisées pour construire des graphiques mettant en relation différents paramètres tels que teneur en eau (figure 2), C_u et C_{ur} (figures 3 à 7) en fonction de la profondeur et vitesse des ondes P et S en fonction de C_u (figures 8 et 9).

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(1) Méthode de l'arrivée de la première onde.

5.REMARQUES

Les échantillons CA-02, CA-03, CA-06, CA-07 et les deux premières sections de CA-01 ont tous été soumis aux essais à l'état intact avant d'être manipulés et transportés jusqu'à

Québec. La partie restante de CA-01, i.e. CA-01-03 à CA-01-09, a été sciée en plusieurs morceaux, tout en demeurant dans le tube d'échantillonnage, et ceux-ci ont été scellés le plus hermétiquement possible avec du papier "saran", des bouchons de plastique et de la cire d'abeille. Ils ont ensuite été empaquetés et envoyés par avion à Québec. Ces échantillons ont donc subit plusieurs manipulations et comportent plus de risques de remaniement et de pertes d'humidité.

Les échantillons CA-07-02 et CA-07-03 ont été ré-utilisés par Michel Bédard dans le cadre d'un projet colloque. Sur ces deux échantillons, il a effectué des essais de résistance (états intact et remanié), de sensibilité et sur le mélange des deux échantillons, des mesures de salinité, l'essai au bleu et les limites d'Atterberg. On trouvera les résultats de ces essais au tableau 3.

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TABLEAU 1

DETAILS DES ECHANTILLONS TESTES

NO. D'ECH.	CA-01	CA-02	CA-03	CA-06	CA-07
LATITUDE (deg. min.)	71 11.90	71 12.10	71 12.80	71 15.40	71 16.30
LONGITUDE (deg. min.)	75 03.10	75 01.90	75 00.00	74 53.20	74 51.30
PROFONDEUR (m)	160.04	187.00	212.00	326.00	330.00
LONGUEUR DE L'ECH. (cm)	160	100	160	133	151
DATE (J/M/A)	20/09/85	21/09/85	21/09/85	22/09/85	21/09/85
HEURE (hrs)	18h20 18h45	20h40		13h00	23h44

TABLEAU 2
RESULTATS DES ESSAIS

NO. D ECH.	PROFONDEUR (cm)	W (%)	Wr (%)	Cu (kPa)	Cur (kPa)	St	Vs (m/s)	Vp (m/s)
CA-01-01	0	37.0	29.8	17.2	2.0	15.2	47.0	
CA-01-02	15	48.1	45.9	6.3	0.9	5.4	32.0	
CA-01-03	30	42.9	46.4	4.7	0.9	3.8	28.0	
CA-01-04	45	35.5	49.0	3.2	0.5	2.7	20.0	
CA-01-05	60	39.7	41.6	5.2	1.1	4.1	34.5	1888.2
CA-01-06	75	41.4	43.5	4.7	1.1	3.6	24.0	1698.7
CA-01-07	90	40.0	41.2	6.8	1.0	5.8	33.0	
CA-01-08	120	36.7	37.6	7.1	1.1	6.0	58.8	
CA-01-09	135	47.7	52.0	6.3	0.8	5.5	29.6	
CA-02-01	0	44.1						
CA-02-02	30	51.5	50.2	8.0	1.5	6.5		
CA-02-03	43	48.9	48.9	9.1	1.3	7.8		
CA-02-04	52	51.3	50.2	9.5	1.1	8.4		
CA-02-05	64	52.4	51.3	6.5	0.8	5.7		
CA-02-06	76	49.8						
CA-02-07	94	29.8						
CA-03-01	0	51.4		12.2			40.0	1800.0
CA-03-01	11		55.9		1.1			
CA-03-02	12	55.6	56.1	6.3	1.1	5.2	30.0	2493.0
CA-03-03	25	59.3	57.3	5.1	0.8	4.3	33.0	
CA-03-04	39	57.5	59.5	4.9	0.7	4.2	39.0	1024.0
CA-03-05	55	59.1	62.3	4.6	0.6	4.1	26.0	1221.0
CA-03-06	68	67.7	68.1	4.2	0.6	3.6	25.0	1682.0
CA-03-07	83	53.6	53.9	4.0	0.5	3.5	30.0	1622.0
CA-03-08	96	50.3	50.0	3.1	0.7	2.4	27.0	1706.0
CA-03-09	111	45.5	46.3	4.2	1.1	3.1	29.0	1750.0
CA-03-10	126	41.7	44.1	4.4	1.2	3.2	27.0	1710.0
CA-06-01	0	69.7		3.6				
CA-06-01	20		82.0		1.0			
CA-06-02	22	83.7	81.0	3.0	0.9	2.1		
CA-06-03	33	76.8	89.5	3.6	0.8	2.8	28.0	
CA-06-04	46	76.8	74.4	3.0	0.7	2.3	24.0	
CA-06-05	60	83.6	79.9	2.6	0.6	2.0	36.0	
CA-06-06	73	81.4	80.7	2.0	0.4	1.6	24.0	
CA-06-07	90	77.4	80.4	3.5	0.5	3.0	40.0	
CA-06-08	105	69.6	76.7	5.1	0.9	4.2	22.0	
CA-07-01	0	71.6	73.4	8.7	1.2	7.5		
CA-07-02	14	75.4	75.8	7.1	1.0	6.1	28.0	
CA-07-03	28	74.0	72.6	5.8	0.9	4.9	28.0	
CA-07-04	42	79.3	80.9	3.7	0.6	3.1	20.0	
CA-07-05	55	84.3	86.1	3.5	0.5	3.0	26.0	
CA-07-06	68	65.4	69.2	1.1	0.4	0.7		
CA-07-07	85	75.7	76.6	4.2	0.5	3.7	26.0	
CA-07-08	100	83.5	80.5	5.1	0.5	4.6	25.0	
CA-07-09	115	73.6	73.7	6.8	0.7	6.1	35.0	

TABLEAU 3
(Résultats obtenus par Michel Bédard)

	C_u (kPa)	C_{ur} (kPa)	S_t
CA-07-02	7	1	7
CA-07-03	4	0.55	7.5

Essais sur le mélange des deux échantillons:

Salinité (g/l)	Essai au bleu (m2/100g d'éch.)	Limites d'Atterberg				
		W_l (%)	W_p (%)	W (%)	I_p	I_l
33	38.0	64	31	78.5	33.2	1.44

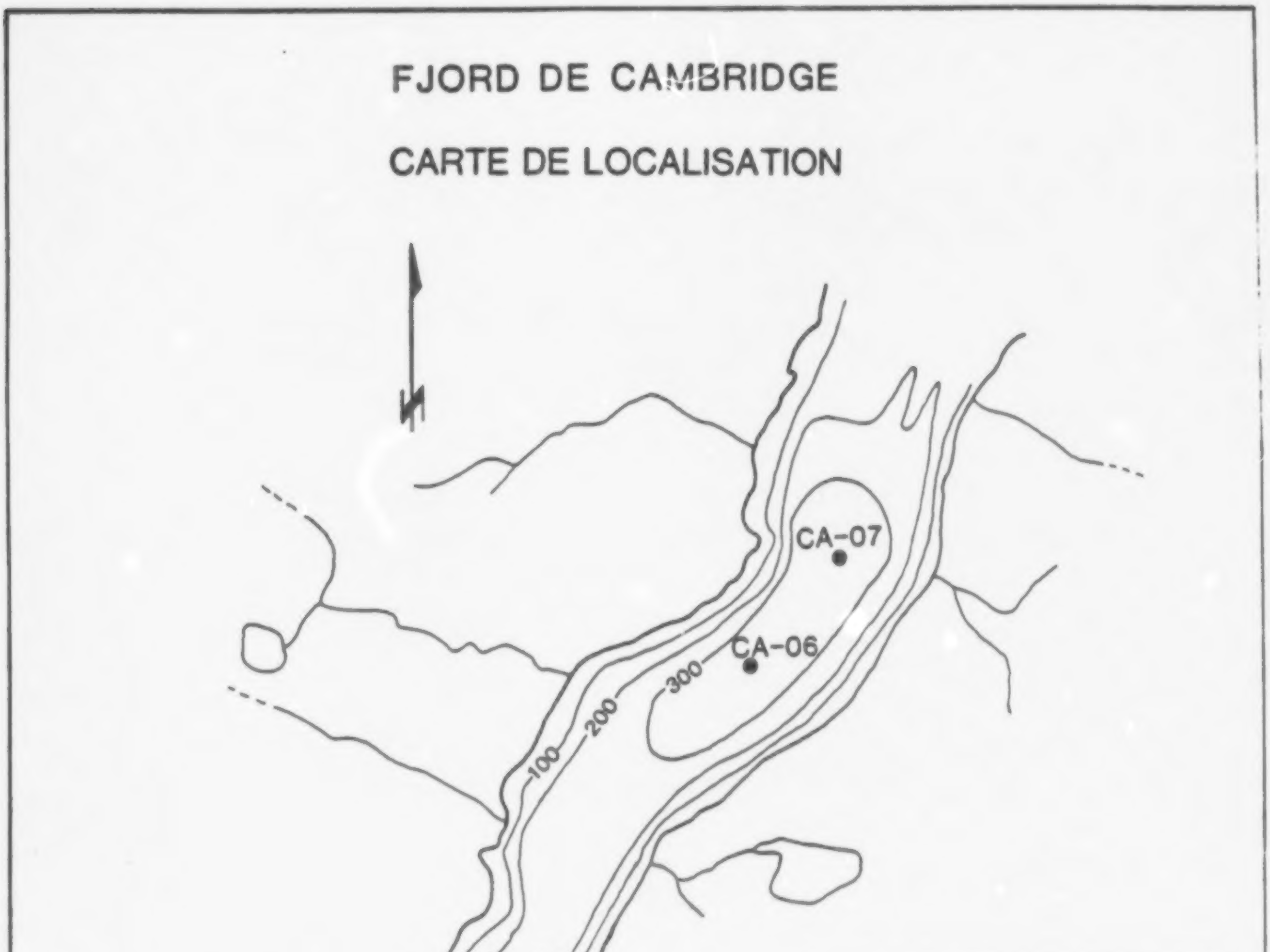

FJORD DE CAMBRIDGE
CARTE DE LOCALISATION
CA-07
CA-06
300
200
100
CA-03
CA-02
CA-01
LEGENDE
CA-03
Point d'échantillonnage
100
Courbe de niveau sous-marine (en métres)
Echelle
0
3
km

Figure 1 - Carte de localisation des sites d'échantillonnage.

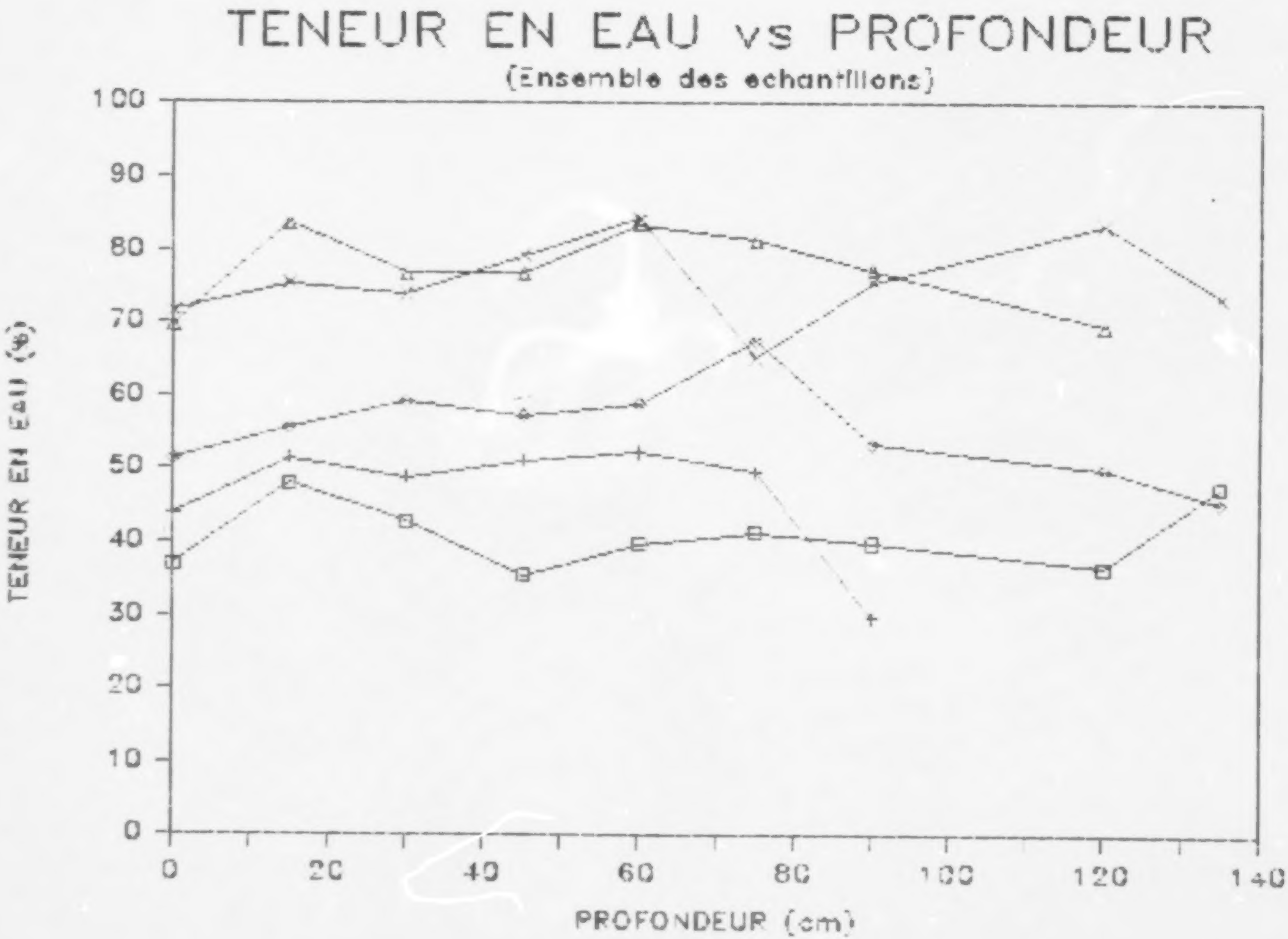

TENEUR EN EAU vs PROFONDEUR
(Ensemble des echantillons)
TENEUR EN EAU (%)
100
90
80
70
60
50
40
30
20
10
0
PROFONDEUR (cm)
0
20
40
60
80
100
120
140

Fig. 2

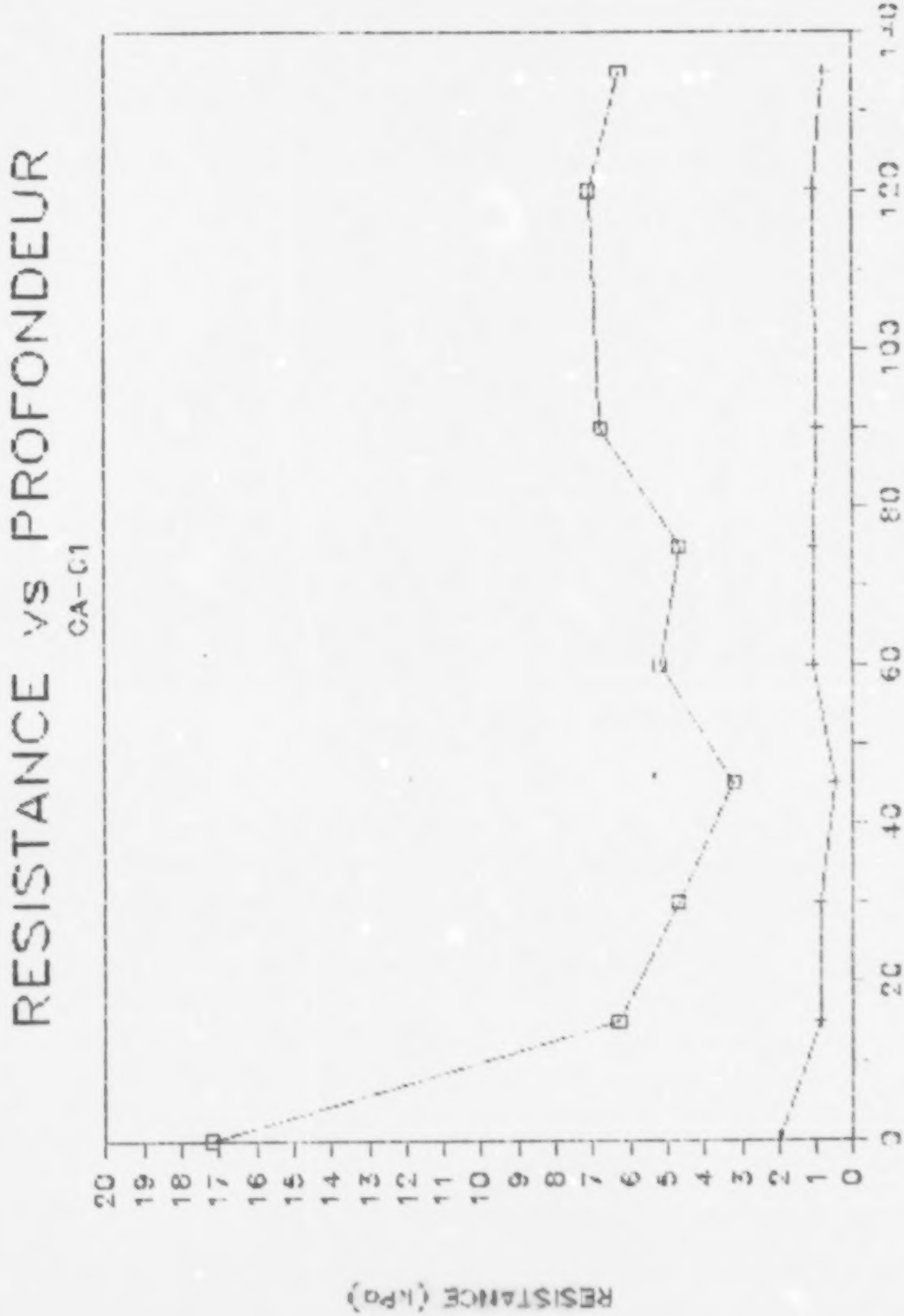

RESISTANCE vs PROFONDEUR
CA-01
RESISTANCE (kPa)
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
20
40
60
80
100
120
140
PROFONDEUR (cm)
□ Cu
+ Cur

Fig. 3

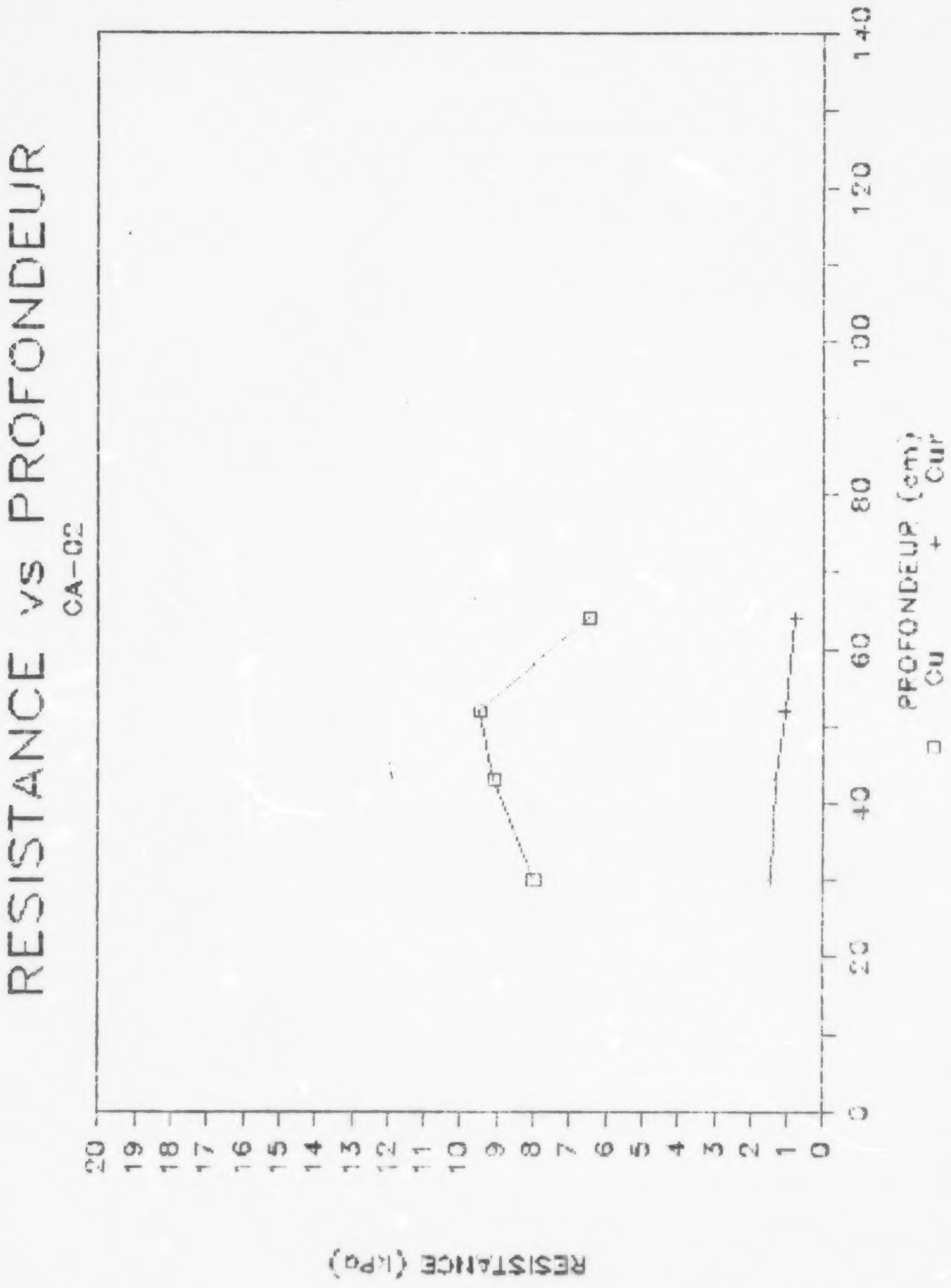

RESISTANCE VS PROFONDEUR
CA-02
RESISTANCE (kPa)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
PROFONDEUR (cm)
0
20
40
60
80
100
120
140
□ Cu
+ Cur

Fig. 4

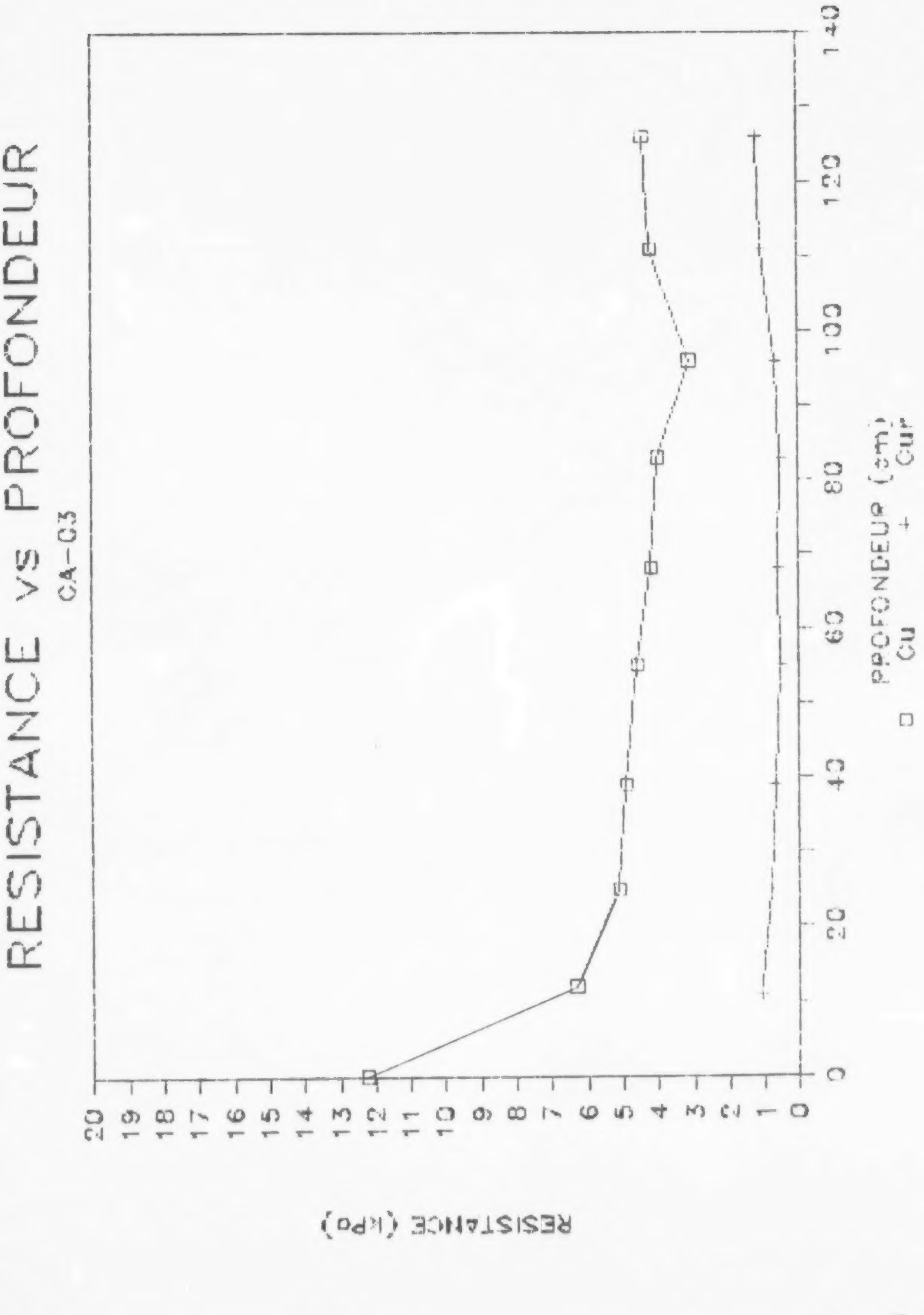

RESISTANCE VS PROFONDEUR
CA-C3
RESISTANCE (kPa)
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
20
40
60
80
100
120
140
PROFONDEUR (cm)
□ Cu
+ Cur

Fig. 5

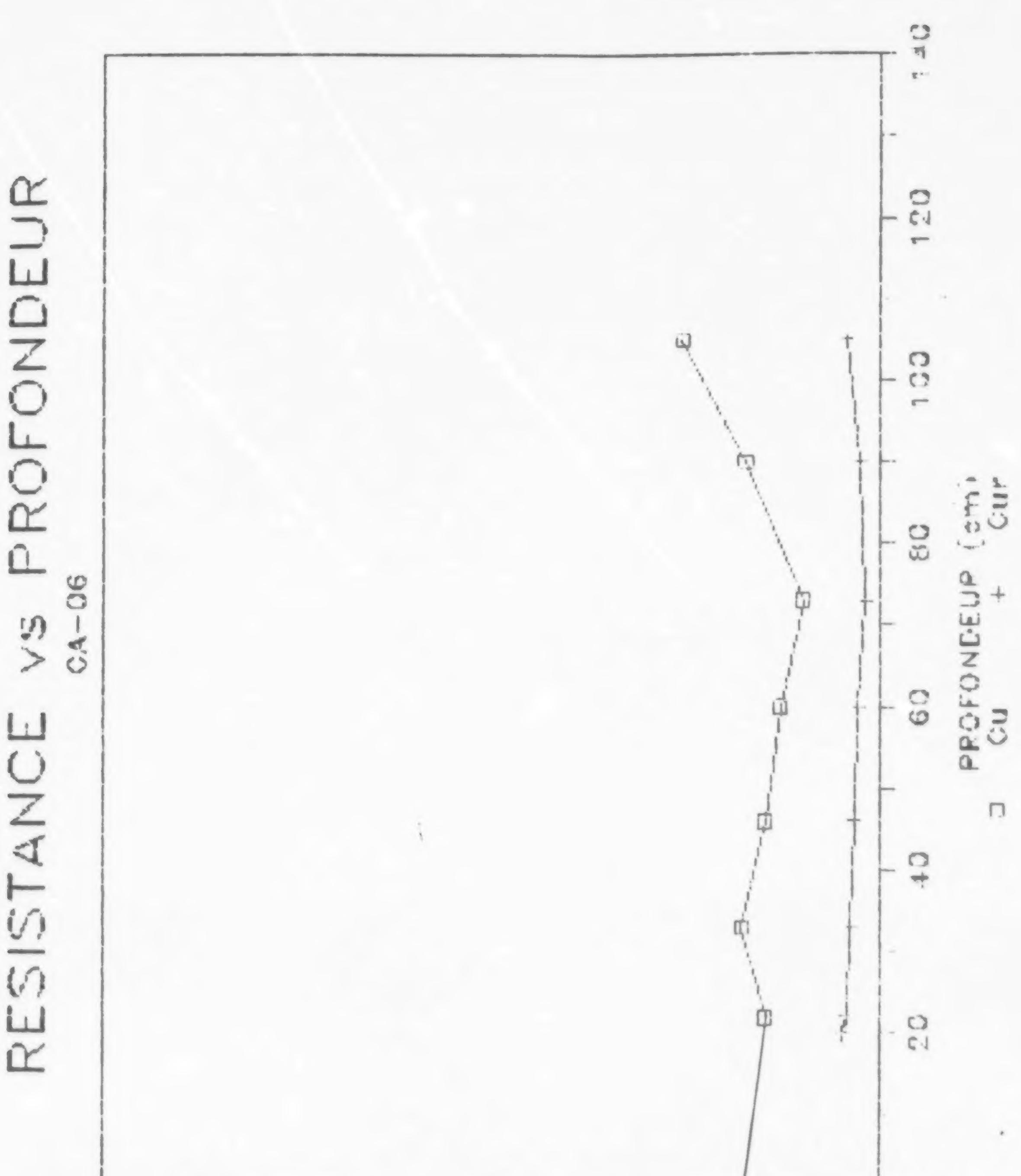
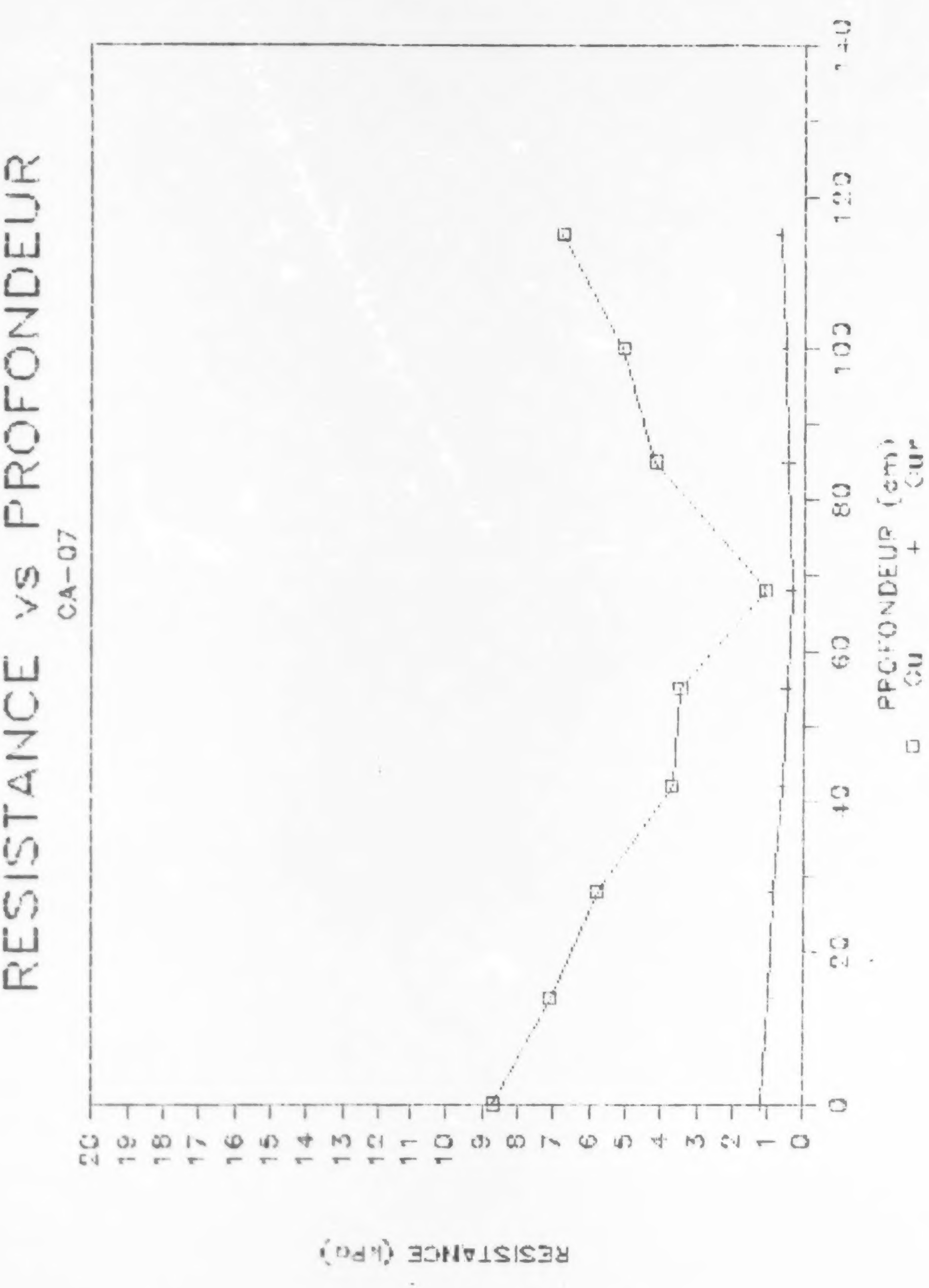

RESISTANCE VS PROFONDEUR
CA-06
RESISTANCE (kPa)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
PROFONDEUR (cm)
0
20
40
60
80
100
120
140
□ Cu
+ Cur

Fig. 6



RESISTANCE VS PROFONDEUR

Fig. 7

VITESSE ONDE S vs RESISTANCE INTACT

(ENSEMBLE DES ECHANTILLONS)

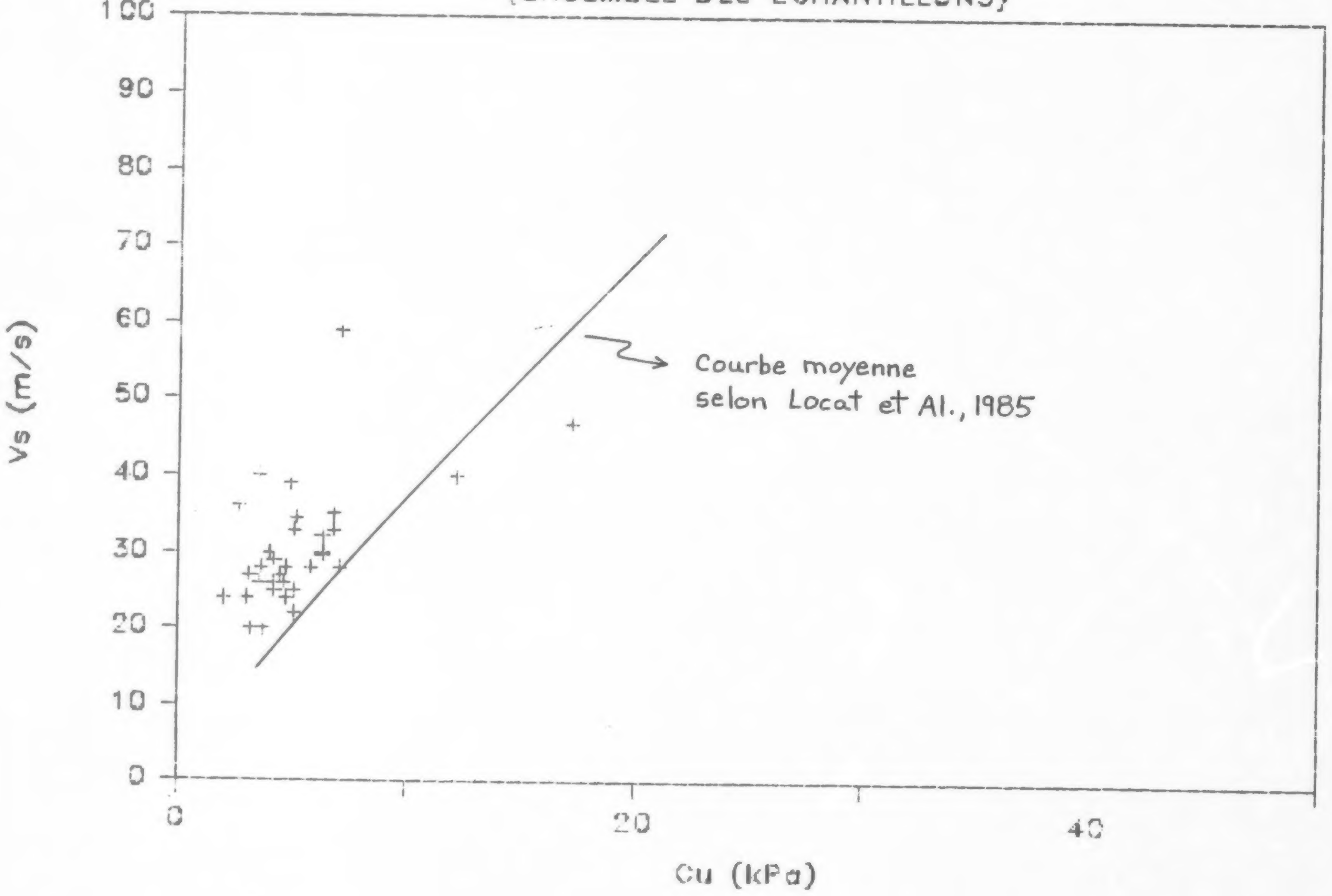
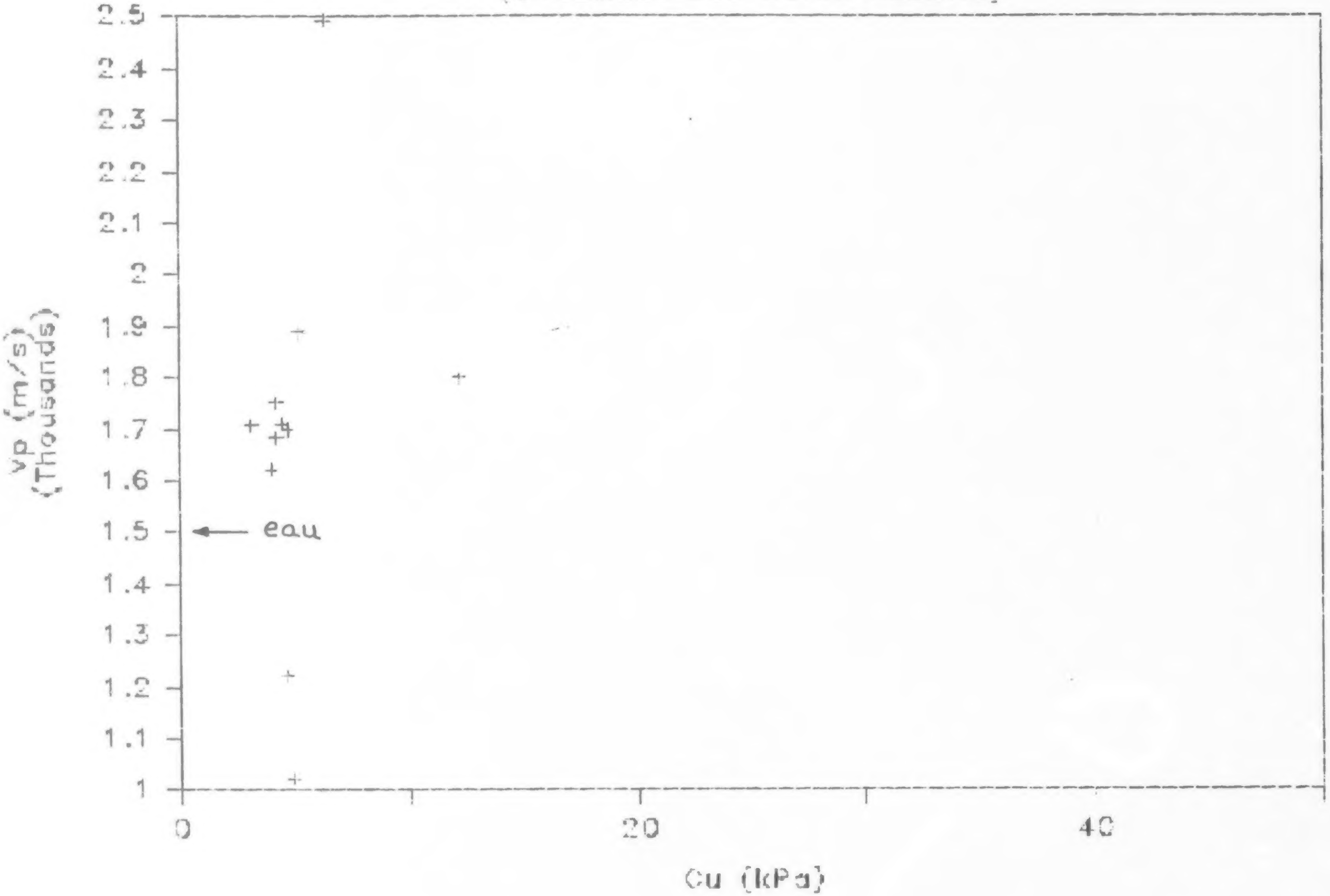


Fig. 8



VITESSE ONDE P vs RESISTANCE INTACT

(ENSEMBLE DES ECHANTILLONS)

Fig. 9

DESCRIPTION DES ECHANTILLONS

CA-01

- Détubé à Québec (en raison du manque de temps) à l'exception des deux premières sections.
- La partie non détubée a été coupée en sections de 15 ou de 30 cm pour le transport.

- Argile gris-brune, homogène, tachetée de noir (M.O.).

CA-01-01 (0 à 15 cm)
- Présence de sable et de cailloux de 0 à 10 cm
- Partiellement remanié et séché sur une longueur de 10 à 15 cm.
- L'argile n'adhère pas au tube sur une longueur de 15 à 20 cm.

CA-01-03 (30 à 45cm)
- Argile grise, molle. (devient plus molle vers 45 cm)
- Présence de petites bulles.

CA-01-04 (45 à 60 cm)
- Beaucoup d'eau au détubage.
- Argile grise sablonneuse, très sablonneuse au centre de l'échantillon.
- Le sable se retrouve surtout sur une moitié de l'échantillon.

CA-01-05 (60 à 75 cm)
- Présence de sable au début de la section.
- Argile grise homogène.
- Présence de petites bulles.

Les échantillons CA-01-05 et CA-01-06 faits avec Johanne Laberge (apprentissage) ont été exposés plus longuement à l'air libre. Aussi, beaucoup de problèmes avec la paraffine pour ces deux échantillons. Ils seront finalement mis dans des sacs.

Les échantillons CA-01-07 et CA-01-08 n'adhèrent pas au tube et sont plus solides que les autres (possiblement perte d'eau).

CA-02

- Le CA-02 est le premier échantillon sur lequel j'ai travaillé. Les essais au céléromètre n'ont pas été faits en raison de problèmes techniques avec l'appareil - pas de batterie.
- Premier 30 cm est remanié et n'adhère pas au tube (semble être partiellement séché aussi).
- Argile grise, assez homogène. Devient de plus en plus molle avec la profondeur.
- A partir de 40 cm, présence de quelques petits cailloux (3 à 5 mm de diamètre) et un de 15 mm de diamètre à la base.

CA-03

- Tube d'abord coupé en deux pour pouvoir faire le détubage.
- L'argile n'adhère pas au tube sur 10 cm.
- Argile gris-brune, légèrement silteuse et tachetée de noir (M.O.). Ces traces de matière organique augmentent avec la profondeur.
- Présence de sable au sommet (0 à 5 cm).
- Présence de bulles d'air ou d'eau un peu partout; ressemble à des traces de bioturbation.

CA-06

- Bouchon de plastique ouvert sur 5 cm au sommet.
- Présence de quelques coquillages entre 0 et 10 cm. Le plus gros mesure 15-20 mm de diamètre.
- L'argile n'adhère pas au tube sur 20 cm.
- Argile gris-brune tachetée de noir (M.O.).
- Casse facilement durant le détubage.
- Accumulation d'eau à la base du tube.

CA-07

- Coupé en deux pour faire le détubage.
- Argile n'adhère pas au tube sur 15 cm.
- Quelques petits coquillages vivants (5 mm) sur 5 à 10 cm au sommet.
- Argile gris-brune, tachetée de noir (M.O.).
- Dans la section CA-07-06: passage rapide d'une argile très molle à une argile passablement plus résistante.

CHAPTER 11

SEDIMENTOLOGIC DATA
FROM
82-031 S.A.F.E. CORES MC-1, MC-7, IT-1 AND TI-1A

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METHODS AND RESULTS

A number of Benthos piston cores (6 cm diam.) obtained during S.A.F.E. cruise 82-031 (Table 1) were analysed at the laboratories of Lakehead University. The paleomagnetic data obtained from these cores was compiled in S.A.F.E. Data Report Volume I (Chapter 14). The present chapter summarizes the results of subsequent carbon, grain size and mineralogic analyses. These various data have formed part of the basis of S.A.F.E. Contribution No. 9 (Andrews, Mothersill and Tabrez, 1986).

Grain size determinations were based on samples of approximately 3 g weight. Each sample was dried at room temperature, weighed, and then mixed with distilled water and wet sieved through a 63 µm (4.00ø) seive. The sand fraction retained in the sieve was weighed and calculated relative to the dry weight of the original sample to determine the sand percentage. A Sedigraph® model 5000D was used for grain-size determinations of material finer than 63 µm. The resulting values of mean grain size and per cent sand for each of the samples are summarized in Table 2. Values of mean grain size, standard deviation and kurtosis are available for some additional samples from MC-1 (Table 3).

The Lakehead University procedure for mineralogical analyses was to dry the samples at room temperature and powder them to less than 63 µm. X-ray diffractometry analyses were carried out on the powdered sample using a Cu K radiation (800 watts intensity) and focusing monochromator at a scanning rate of 1° min-^{1}. The minerals present were identified by tables from Berry (1972) and Grim (1968).

X-ray diffractometry analyses for total carbon were carried out on 1 g of powdered sample. A Perkins Elmer CHN Analyzer was used to determine organic carbon on a second 1 g cut of powdered sample that had been treated with sulphurous acid. The resulting values of organic and inorganic carbon are summarized in Table 4.

X-ray diffractometry analyses for other minerals show that the sediments of MC-1 and MC-7 consist of major amounts of quartz and plagioclase, subordinate amounts of K-feldspar, phlogopite, vermiculite, and illite and minor amounts of dolomite and chlorite. The mineral assemblage of IT-1 and TI-1A consists of major amounts of quartz and plagioclase, subordinate amounts of K-feldspar, illite and chlorite and very minor amounts of glaucophane and dolomite.

A heavy mineral separation using tetrabromethane (specific gravity 2.94 g cm^{-3}) was carried out on the wet sieving-segregated sand fraction of IT-1 and TI-1A. Representative cuts of the heavy and light materials were mounted on slides and the minerals identified by petrographic microscopy (Krumbein and Pettijohn, 1938). The results are summarized in Table 5.

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Berry, L.G.
1972: Selected Powder Diffraction for Minerals. Swarthmore, N.Y.: Joint Committee on Powder Diffraction Standards, 1081 p.

Grim, R.E.
1968: Clay Minerals. New York: McGraw-Hill, 596 p.

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1938: Manual of Sedimentary Petrography. New York: Appleton-Century-Crofts, 549 p.

TABLE I: CORE LOCATION DATA

CORE	LATITUDE (N)	LONGITUDE (W)	DEPTH (m)	LENGTH (m)
MC-1	69°31.9'	69°47.5'	329	11.01
MC-7	69°37.5'	69°16.0'	497	11.21
IT-1	69°11.5'	69°10.0'	167	6.34
TI-1A	69°05.4'	68°54.0'	302	8.24

TABLE 2A

Mean Grain Size and Sand Percentage

MC-1			MC-7		
Depth (cm)	Mean Grain Size (Phi Units)	Sand (%)	Depth (cm)	Mean Grain Size (Phi Units)	Sand (%)
25	9.00	16.06	0	9.08	6.10
50	9.00	2.20	25	9.00	3.57
75	9.33	2.59	50	9.08	5.93
100	9.33	3.40	75	9.67	6.10
125	9.33	1.36	100	9.50	0.89
150	9.33	2.35	125	9.50	2.99
175	9.50	0.57	150	9.50	8.52
200	9.33	4.42	175	9.58	1.37
225	9.58	2.68	200	9.33	2.91
250	9.58	8.48	225	9.58	4.10
275	9.58	1.78	250	9.42	0.81
300	9.58	1.96	275	9.50	1.01
325	9.50	2.91	300	9.58	0.51
350	9.67	3.07	325	9.58	3.44
375	9.67	0.81	350	9.58	2.57
400	8.92	1.06	375	9.75	2.38
425	9.67	0.38	400	9.50	1.13
450	9.83	1.66	425	9.50	2.27
475	9.67	0.62	450	9.58	1.82
500	9.50	5.26	475	9.67	4.12
525	9.83	0.34	500	9.50	3.64
550	9.83	1.32			
575	9.33	0.51			
600	9.33	1.75			
625	9.25	0.81			
650	9.08	0.80			
675	9.00	0.51			
700	9.50	0.18			
725	9.33	-			
750	9.42	1.64			
775	9.58	0.32			
800	9.58	1.37			
825	9.42	0.16			
850	9.50	0.97			
875	9.42	0.83			
900	9.67	0.22			
925	7.50	3.79			
950	9.17	2.06			
975	9.17	0.28			

TABLE 2B

Mean Grain Size and Sand Percentage

IT-1			TI-1A		
Depth (cm)	Mean Grain Size (Phi Units)	Sand (%)	Depth (cm)	Mean Grain Size (Phi Units)	Sand (%)
8	7.00	34.20	8	3.20	95.02
17	7.90	26.82	17	3.00	91.31
26	6.10	43.06	26	2.78	95.26
35	6.79	86.42	32	4.46	69.94
44	6.15	45.59	41	5.18	60.72
53	3.88	63.31	50	4.82	65.12
62	3.04	81.68	56	5.19	55.10
71	2.89	92.12			
80	5.29	50.15	74	4.88	59.52
89	3.63	72.25	83	4.81	60.18
95	4.32	56.75	92	5.19	57.01
107	2.71	92.28	101	4.42	70.93
116	4.97	60.62	110	4.43	72.14
125	4.77	63.86	119	4.48	69.51
134	4.95	49.52	128	3.50	82.16
143	4.65	57.10	137	3.98	79.24
152	4.33	66.32	146	4.31	70.97
179	2.56	90.07	155	4.63	69.95
185	2.37	100.00	164	3.18	86.32
197	4.50	61.14	173	4.29	73.10
206	5.25	57.21	182	4.49	70.69
215	6.01	45.06	215	4.91	70.85
224	4.85	51.58	224	5.00	65.25
233	5.15	55.40	233	3.81	75.81
242	5.97	42.89	242	4.50	80.93
251	6.33	42.84	251	4.44	69.81
260	9.22	13.04	260	4.00	75.79
269	5.38	53.70	269	3.42	83.10
278	2.60	81.13	278	3.17	84.52
287	6.00	47.80	287	3.90	75.91
296	8.56	14.59	296	3.49	81.19
305	5.17	61.33	305	3.96	73.53
315	2.60	89.95	314	4.51	72.16
324	4.52	66.04	323	3.93	79.70
333	5.12	57.95	332	4.23	79.08
342	7.92	23.80	341	4.86	65.01
351	2.96	90.55	350	5.91	46.91
360	2.73	95.15	359	5.21	60.19
369	1.75	97.38	368	5.69	54.51
378	5.98	42.96	377	7.23	36.61
387	7.77	19.97	386	6.46	50.71
396	6.10	32.38	395	4.53	65.74
405	8.21	20.81	404	5.05	59.08
414	3.70	88.53	413	3.79	75.63
423	6.05	25.30	422	5.69	51.02
432	7.40	22.13	431	7.09	43.07
441	7.02	30.95	440	6.27	75.21
450	6.08	40.16	449	4.81	68.32
459	7.21	31.09	458	6.00	58.63

TABLE 2C

Mean Grain Size and Sand Percentage

IT-1

Depth (cm)	Mean Grain Size (Phi Units)	Sand (%)
465	5.29	52.27
483	6.04	41.72
492	8.99	15.55
501	5.00	56.68
510	2.72	94.57
519	4.85	47.11
528	3.43	77.92
537	2.27	96.81
546	3.19	90.81

TI-1A

Depth (cm)	Mean Grain Size (Phi Units)	Sand (%)
467	5.53	52.41
476	6.32	47.04
485	5.01	63.57
494	4.65	63.76
503	4.90	50.12
512	6.62	42.31
521	5.55	51.78
530	6.28	41.91
539	6.68	39.42
548	6.95	41.53
557	7.29	42.03
566	7.08	42.81
575	5.71	56.09
584	6.17	49.92
593	7.63	33.87
602	6.68	44.33
611	8.71	33.11
620	7.53	38.19
629	6.08	50.00
638	7.59	46.99
647	7.48	40.93
656	7.49	35.27
665	7.83	35.22
674	7.38	35.24
683	7.19	42.17
692	6.93	45.01
701	7.81	40.00
710	6.92	43.87
719	6.90	47.16
728	7.39	37.73
737	7.58	22.71
746	7.02	43.18
755	5.76	52.84
764	7.19	42.91
773	6.26	51.16
782	6.29	46.03
891	6.30	38.04
900	6.89	45.89

TABLE 3: Grain Size Parameters of Graded Sand Beds in MC-1

DEPTH (cm)	MEAN (Mz)	INCLUSIVE GRAPHIC STANDARD DEVIATION (σ_I)	INCLUSIVE GRAPHIC SKEWNESS (SK_I)	KURTOSIS (K_G)
0	3.37	0.78 Moderately Sorted	-0.34 Strongly coarse skewed	1.62 Leptokurtic
26	3.10	0.80 "	-0.15 Coarse skewed	0.81 Platykurtic
38	2.72	0.89 "	-0.24 "	0.79 "
89	3.29	0.61 "	+0.07 Near-Symmetrical	1.06 Mesokurtic
201	3.09	0.53 "	-0.39 Strongly coarse skewed	0.87 Platykurtic
222	3.19	0.60 "	+0.17 Coarse skewed	0.93 Mesokurtic
330	2.63	0.57 "	+0.16 "	1.87 Leptokurtic
505	3.11	0.61 "	+0.26 "	1.03 Mesokurtic
751	2.95	0.68 "	+0.27 "	0.83 Platykurtic
931	3.22	0.71 "	+0.03 Near-Symmetrical	0.98 Mesokurtic

TABLE 4

Organic and Carbonate Carbon

MC-1

Depth (cm)	Total C (%)	Org C (%)	Carb C (%)
50	0.63	0.62	-
100	0.87	0.78	0.09
150	0.92	0.64	0.28
200	0.90	0.72	0.18
250	0.81	0.49	0.32
300	0.39	0.18	0.19
350	0.66	0.62	0.04
400	0.69	0.49	0.20
450	0.72	0.55	0.17
500	0.49	0.45	0.04
550	0.51	0.51	-
600	0.23	0.23	-
650	0.34	0.30	0.04
700	0.40	0.38	-
750	0.39	0.37	-
800	0.39	0.36	0.03
850	0.48	0.41	0.07
900	0.40	0.35	0.05
950	0.32	0.31	-

MC-7

Depth	Total C (%)	Org C (%)	Carb C (%)
0	1.50	1.36	0.14
50	1.37	1.19	0.18
100	1.18	1.05	0.13
150	0.91	0.73	0.18
200	0.85	0.62	0.20
250	0.90	0.61	0.29
300	0.80	0.60	0.20
350	0.69	0.51	0.18
400	0.63	0.55	0.08
450	0.81	0.68	0.13
500	0.63	0.63	-

IT-1

Depth (cm)	Total C (%)	Org C (%)	Carb C (%)
2	0.09	0.09	-
38	0.17	0.16	-
101	0.12	0.12	-
149	0.11	0.11	-
200	0.19	0.18	-
216	0.22	0.22	-
248	0.11	0.11	-
302	0.23	0.22	-
391	0.10	0.10	-
402	0.30	0.29	-
447	0.41	0.39	-
465	0.03	0.03	-
477	0.15	0.15	-
522	0.28	0.27	-
550	0.39	0.37	-

TI-1A

Depth	Total C (%)	Org C (%)	Carb C (%)
53	0.16	0.15	-
98	0.16	0.16	-
152	0.18	0.11	0.07
189	0.13	0.08	0.05
248	0.17	0.17	-
303	0.10	0.10	-
348	0.48	0.45	0.03
402	0.52	0.52	-
453	0.53	0.53	-
504	0.54	0.54	-
550	0.62	0.62	-
600	0.86	0.86	-
651	0.96	0.92	0.04
699	0.74	0.73	-
750	0.82	0.73	0.09
778	0.88	0.82	0.06

TABLE 5: Heavy Mineral Abundance and Type in Sand Fractions of IT-1 and TI-1A

Core	Depth	Heavy (%)	Core	Depth	Heavy(%)
Itirbilung -1	50	20.93	Tingin -1A	251	15.62
Itirbilung -1	53	0.55	Tingin -1A	324	13.31
Itirbilung -1	116	16.65	Tingin -1A	459	0.17
Itirbilung -1	206	8.50	Tingin -1A	522	8.45
Itirbilung -1	324	11.22	Tingin -1A	783	19.12
Itirbilung -1	564	6.11			

Itirbilung -1	50	major biotite phlogopite minor muscovite phlogopite
	53	major biotite minor zircon, sillimanite, apatite, tourmaline, topaz, kyanite, garnet
	116	major biolite minor garnet, sillimanite
	206	major biotite, phlogopite minor, hypersthene, garnet, sillimanite, zircon, rutile, titanite, apatite, topaz
	324	major phlogopite, muscovite minor topaz, magnetite, tourmaline
	564	major biotite, phlogopite minor muscovite, garnet, topaz, tourmaline, zircon, rutile, magnetite

Tingin -1A	251	major biotite, muscovit minor apatite, magnetit
	324	major biotite minor muscovite, garnet tourmaline
	459	major biotite minor, zircon, chlorite tourmaline, topaz, apat
	522	major biotite, muscovite minor tourmaline, garne chlorite
	763	major biotite,chlorite minor garnet, sillimani

CHAPTER 12

DOWNCORE VARIATIONS IN THE CARBON CONTENT OF FIORD PISTON CORES AND ASSOCIATION WITH SEDIMENTATION RATES

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INTRODUCTION

One of the objectives of the University of Colorado's S.A.F.E. program was the estimation of sedimentation rates in piston cores from the outer, more distal fiord basins. Some discussion of the problems of dating fiord sediments from the eastern Canadian Arctic has already been presented as a S.A.F.E. contribution (Andrews and others, 1985). The purpose of this short paper is to present data on the downcore variations in organic carbon and the relationship to sedimentation rates. In addition data are presented on the distribution of Pre-Quaternary pollen taxa in the cores- this serves as a warning that some of the carbon may be recycled. Specific discussion on the ages of certain piston cores are contained in papers by Andrews and others (1985, 1986), Jennings (1986), and Andrews (in press). The last paper is concerned with the estimating net sediment accumulation in both fiord and shelf cores from eastern Baffin Island. Additional information on the six cores used for this study are given in Osterman (1982), Syvitski and Blakeney (1983), and Syvitski (1984).

METHODS

Radiocarbon dates on the majority of cores have been obtained on the fine-grained <2 um acid-insoluble organic fraction (AIOF) (see Kihl, 1975 for an outline of the method). In some cores (e.g. HU82-SU5), small articulated bivalves were detected on the x-radiographs and were subsequently sampled and ^{14}C dated. Samples with the laboratory designation AA- were dated with the NSF Tandem Accelerator Mass Spectrometer (TAMS) at the University of Arizona (cf Andrews et al., 1985). Samples of shell varied between 20 and 50 mg, although a 4 mg sample of foraminifera was also successfully run. The use of the TAMS allowed small segments of core to be dated on the AIOF; the estimated weight of carbon in the submitted samples varied between 40 and 100 mg.

The percentage of carbon in the cores was determined by the Walkley-Black titration method using potassium dichromate solution (Walkley, 1947). This approach allows almost complete discrimination between "active" organic matter and the various forms of elemental carbon. The various highly condensed forms of carbon can be estimated from the "%Readily oxidizable organic carbon" by multiplying the latter by 1.3 (this is based on empirical relationships)(Walkley, 1947). In this report I use the term "%Carbon" for the readily oxidized organic carbon. Reproducibility of the method, with the same operator, is excellent (ca. +/- 0.05% by weight).

As part of NSF grant DPP-8306581, Short and Mode (Short et al., in prep) have studied the palynology of cores HU77-159, HU82-SU5, HU83-IT3.1, HU83-MC4.1, HU82-CL5, and HU83-CA4.1. As a routine part of the counting they noted the number of Pre-Quaternary pollen grains at each level in these cores. At certain times these grains constitute a significant percentage of the total polien count (i.e. Mudie and Guilbault, 1982; Mudie and Short, 1985). These results are important for two reasons: 1) they allow some discussion of the probability of contamination of the AIOF by old carbon; and 2) they indicate intervals when the %Carbon in a core reflects both the addition of contemporary and "old" carbon to the fiord floor.

RESULTS

1. Downcore %Carbon trends:

At the moment we have data on six (6) cores (Table 1 and Figure 1). All but HU77-159 from middle Frobisher Bay have been taken as part of the S.A.F.E. Project. Although each core in one sense has a unique record there are clear patterns in the trends of %Carbon with depth.

Figure 2 shows "box plots" (Velleman and Hoaglin, 1981) of the six cores whereas Table 2 lists relevant statistics. The %Carbon samples in all six cores are positively skewed. The medians for the six samples range from a high of 0.93% in HU77-159 to 0.16% in HU82-CO4. Only a few outliers are identified (i.e. samples that lie beyond "reasonable" limits) by the * and O symbols (Fig. 2), with the largest number occurring in HU82-CO4.

Four of the cores have an overall decrease in %Carbon from the top of the core to the base. This is especially evident in HU82-TI3. Cores HU77-159 and HU82-SU5 show a similar response except that there are high carbon percentages near the base of the core. In HU82-TI3, HU82-CO4, HU82-SU5 and HU77-159 there is a notable change in the slope of the Depth/%Carbon plot toward the top of the cores. This occurs at ca. 3.8 m in HU82-TI3, and 2.5, 2, and 3.7 m respectively for the other three cores.

2. Pre-Quaternary pollen percentages:

The same sample levels were not necessarily used for the %Carbon and %Pre-Quaternary pollen determinations. Figure 3 shows a plot of the downcore variations of Pre-Quaternary pollen calculated from:

(No. Pre-Quat/(No. Pre-Quat + No. Quat))*100

As a general rule it appears that significant Pre-Quaternary pollen amounts were being transported into the fiords during regional deglaciation, that is between 8 and 10 ka. At some levels the Pre-Quaternary pollen accounts for >50% of the total pollen count. In some instances there may be a correlation between high %Carbon and high percentages of Pre-Quaternary pollen. This is especially true for HU77-159 and HU82-SU5. In both these cores, Andrews et al. (1985) reported that TAMS ^{14}C dates on shells were significantly younger than the AIOF dates. This difference in age between the two carbon materials indicates that there was considerable mixing of old and contemporary carbon at these sites during deglaciation.

A comparison of Figures 1 and 3 suggests that at HU77-159 and HU82-SU5 the peaks in %Carbon in the lower sections of the cores is related to the addition of considerable quantities of "old" carbon. At the time when there is an increase in the percentage of carbon in the sediments (Fig. 1) there is a dramatic decrease in the percentage of Pre-Quaternary pollen at both core localities.

In McBeth Fiord, at site HU83-MC4.1, there is a rise in the %Carbon between 2 and 4 m that is matched by moderate values of Pre-Quaternary pollen (Fig. 3). There is a hint that the same situation applies at HU82-CL5, but no pollen analysis has been undertaken in the lower part of the core because of the estimated high rate of sedimentation (Jennings, 1986).

The source(s) for the Pre-Quaternary pollen can only be speculated upon but probably include the erosion by glacial ice, and icebergs, of Cretaceous and Tertiary sediments from various areas of Arctic Canada and parts of Greenland. The presence of these grains in the fiords presents a potential method for tracing the strength of the marine connection between the fiords and the shelf and Baffin Bay.

3. Radiocarbon dating:

Figures 1 and 3 offer insights into the prospects for further ^{14}C dating of fiord sediments. Given the TAMS or AMS systems in both Canada and the U.S.A. there is now no difficulty in obtaining a ^{14}C date from very small samples of sediment. A sample of 10 g (dry weight) should be enough to provide a >50 mg sample of carbon. Furthermore, the data on Figure 3 suggest that samples from the upper 2 m of the cores should give reasonably reliable ^{14}C dates because the percentage of Pre-Quaternary pollen is usually < 7% and frequently 0 % (Short and Mode, unpubl. data). Interestingly, there is a suggestion in the plot from HU83-MC4.1 (Fig. 3) that this core extends through an interval of high Pre-Quaternary pollen percentages (between 2 and 6 m) into a zone comparable with that above 2 m. Available ^{14}C dates (Table 3) indicate that the lowermost date of 16.7 ka (AA-653) is from the lower zone with low levels of Pre-Quaternary pollen. The upper ^{14}C date of 2.8 ka (AA-1111) is from the upper zone of low "old" pollen. Hence both dates may be more reliable indicators of the true age of the sediments at these two depths (Table 3- Note, dates in this table are corrected. Approximations of the laboratory quoted ages can be obtained by dividing by ca. 0.64) than samples from HU77-159 or HU82-SU5 where there is substantial old pollen influx in sections of the cores (i.e. Fig. 3 and Table 3). In this context it is interesting to note that paired TAMS dates on shell and the AIOF from 1.65 m in HU82-SU5 gave ages of 5.8 and 4.06 ka respectively! This is the first example that I know about where the shell dated older than the sediments.

4. Sedimentation rates and carbon flux:

Farrow et al. (in press) presented evidence from the S.A.F.E. investigation which indicated that %Carbon increased down-fiord and that this may reflect a seaward decrease in the rate of clastic sedimentation. Previous investigations of sedimentation rates (Andrews et al., 1985) suggested that sedimentation rates had changed by an order of magnitude between the deglacial period and the subsequent interglacial (i.e. high rates > 6 ka) (Jennings, 1986).

The data in Farrow et al. (in press) and Syvitski et al. (this volume) suggests an hypothesis that sedimentation rates are inversely proportional to the %Carbon. In-other-words, we assume that the production of carbon is constant and that the percentage by weight in the sediment is a measure of the input of clastics. Figure 4A and B graphs the data. In the first graph, where no specific cores are designated, it is difficult to find overall trends. Weak arguments could be made for either i) an increase of the sedimentation rate with a decrease in the %Carbon (i.e. 1/%C is larger); or ii) the reverse. Figure 4B distinguishes between the different core sites and "eyeball" lines have been drawn for each core. There is now some evidence that favours a nonlinear relationship between the sedimentation rate and 1/%Carbon.

5. Carbon accumulation rates:

An alternative hypothesis to the sedimentation rate/carbon argument advanced above is that the accumulation of carbon has varied throughout the late Quaternary. In addition, diagenesis and bacterial action might also cause changes in the %Carbon by weight in cores.

First order estimates of carbon accumulation can be calculated for the last 5 ka, when sedimentation rates where between 30 and 60 cm/ ka, and the preceeding deglacial interval when sedimentation rates where >500 cm/ ka. In this calculation, variations in density are ignored as they are overwhelmed by the change in the sedimentation rate and the change in the %Carbon.

Case 1: Sedimentation rate 20 years/cm; %Carbon=1%; density= 1.4 g/cc. Accumulation of carbon=0.7 mg/cm2 a.

Case 2: Sedimentation rate 2 years/cm; %Carbon=0.2%; same density as Case 1. Accumulation of carbon=1.4 mg/cm2 a.

However, Figure 3 indicated that >50% of the pollen fraction was reworked, hence it may be that the rate of carbon production (or preservation in the cores) has not changed drastically during the last 10,000 years or so.

ACKNOWLEDGMENTS

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TABLE 1

Core location, water depth, and core lengths

Core Id.	Lat & Long	Water depth(m)	Core length (cm)
HU77-159	62° 50.05",& 67° 02.04"	570	969
HU82-SU5	66° 33.30",& 61° 42.60"	146	770
HU82-CO4	67° 15.20",& 64° 18.20"	356	1090
HU82-TI3	69° 11.5",& 68° 23.50"	487	1141
HU83-MC4.1	69° 31.40",& 69° 57.00"	549	810
HU82-CL5	71° 05.50",& 71° 53.00"	683	1016

TABLE 2

Median and inner and outer fences for the %Carbon in the six cores described in this study. The inner and outer fences include 50% of the sample distribution.

Core Id.	N=	inner fence	median	outer fence
HU77-159	33	0.77	0.93	1.7
HU82-SU5	37	0.57	0.62	0.84
HU82-CO4	31	0.125	0.16	0.195
HU82-TI3	24	0.345	0.42	0.62
HU83-MC4.1	9	0.43	0.50	0.91
HU82-CL5	41	0.28	0.345	0.48

N=, i.e. the number of observations

TABLE 3

Radiocarbon dates used in this study (see Andrews et al. (1985) for discussion. Dates corrected. O=AIOF;S=shell

Core Id.	Depth(cm)	Date	Lab. No.
HU77-159	135(o)	2745+/-145	GX-7881
	275(o)	4560+/-180	GX-7091
	425(s)	8060+/-290	AA-413
	890(s)	8320+/-370	AA-191
HU82-SU5	165(s)	5800 +/-330	AA-712
	277(s)	9410+/-400	AA-412
	618(s)	10,490+/-450	AA-264
HU82-CO4	595(o)	date pending	AA-1918
HU82-TI3	140(o)	3870+/-	GX-11335
	374(o)	7500+/-	GX-9434
	1092(o)	8700+/-	AA-190
HU83-MC4.1	83(o)	2819+/-103	AA-1011
	(s)	date pending	AA-1801
	784(o)	10,900+/-	AA-653
HU82-CL5	104(o)	3660+/-	AA-651
	175(o)	5840+/-	GX-9430
	973(o)	7370+/-	AA-651

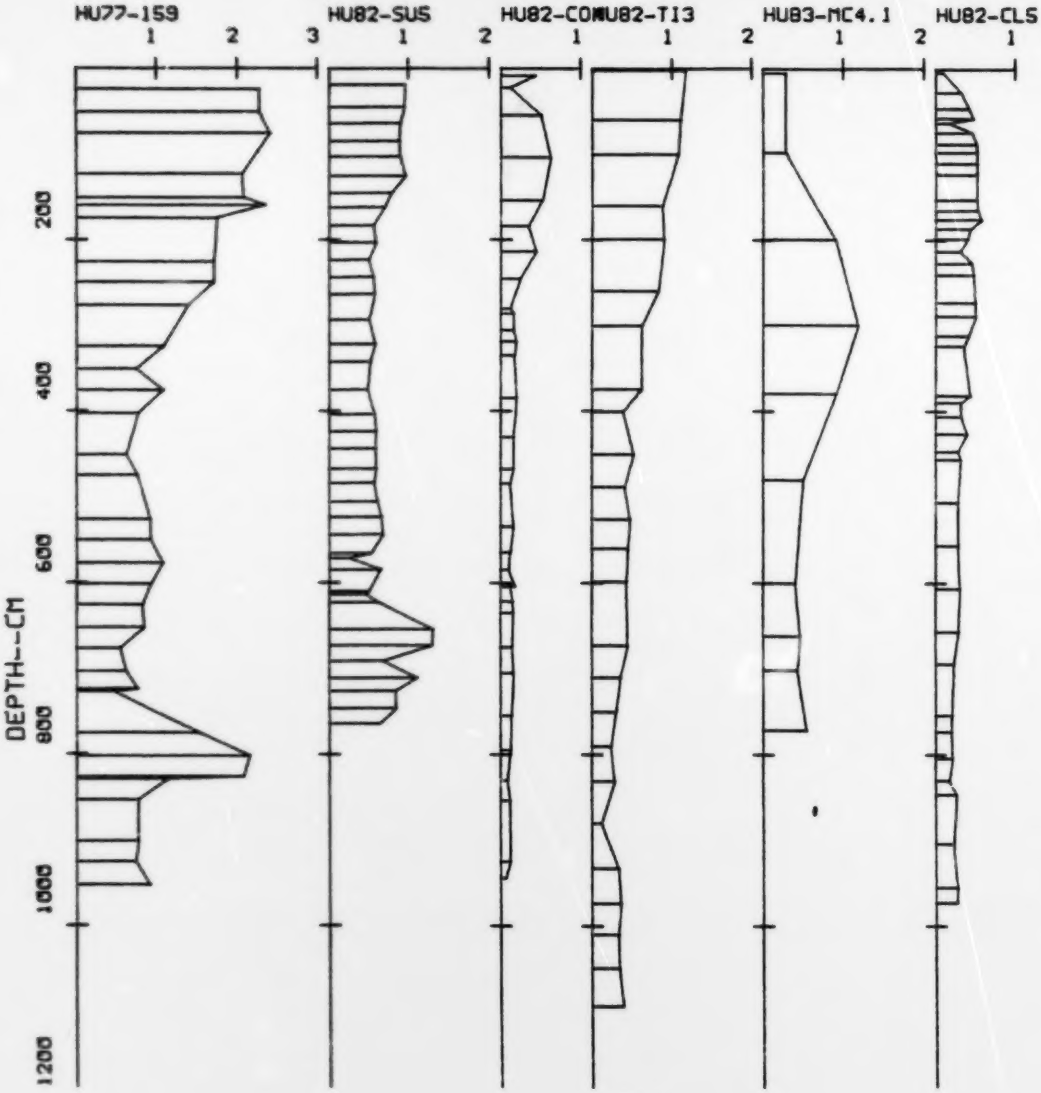

Figure 1. Downcore variations in the percentage of organic carbon in six cores from eastern Baffin Island (see Table 1).

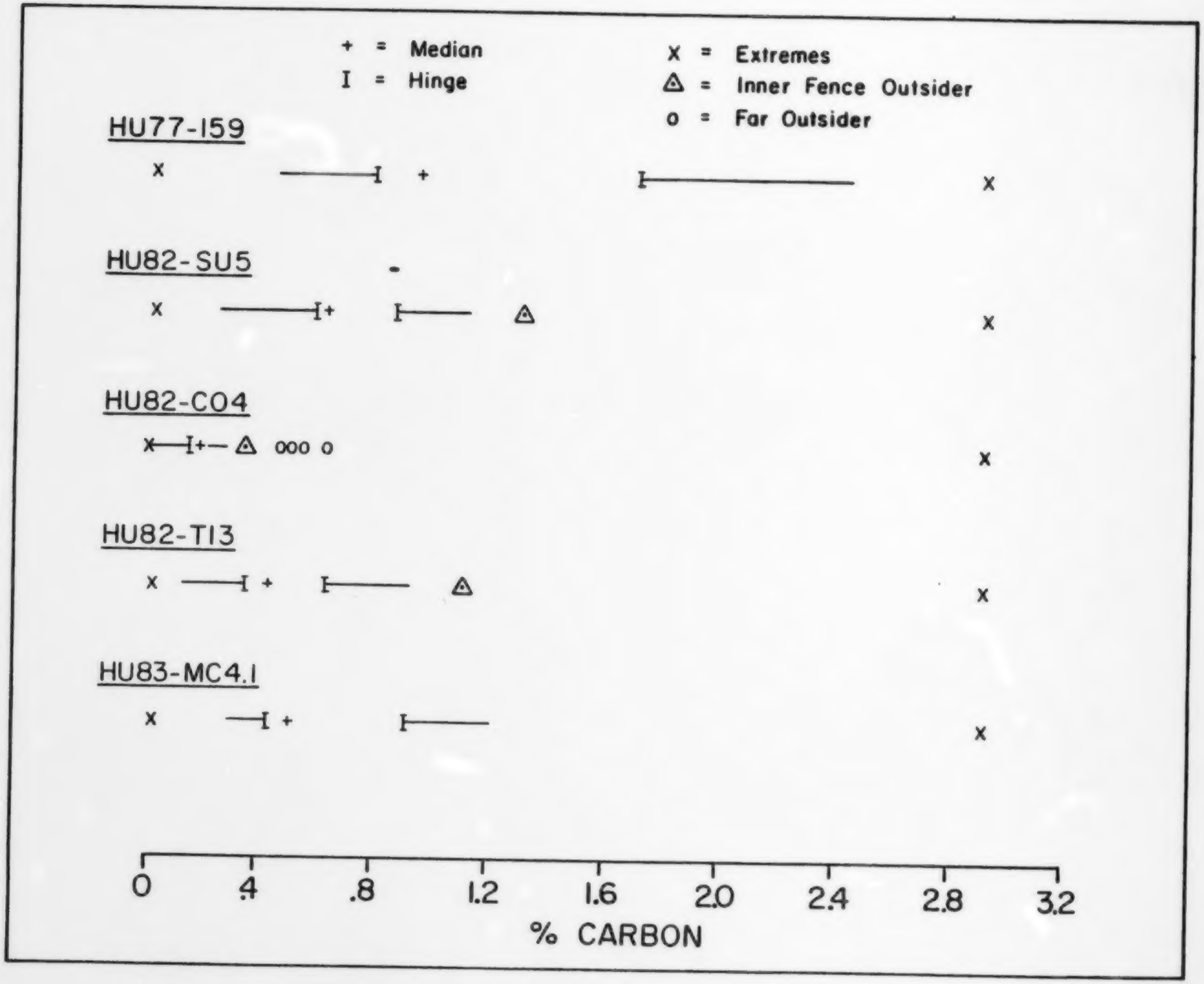

Figure 2. Box plots of the %Carbon data from the six cores (see Table 2 for more information).

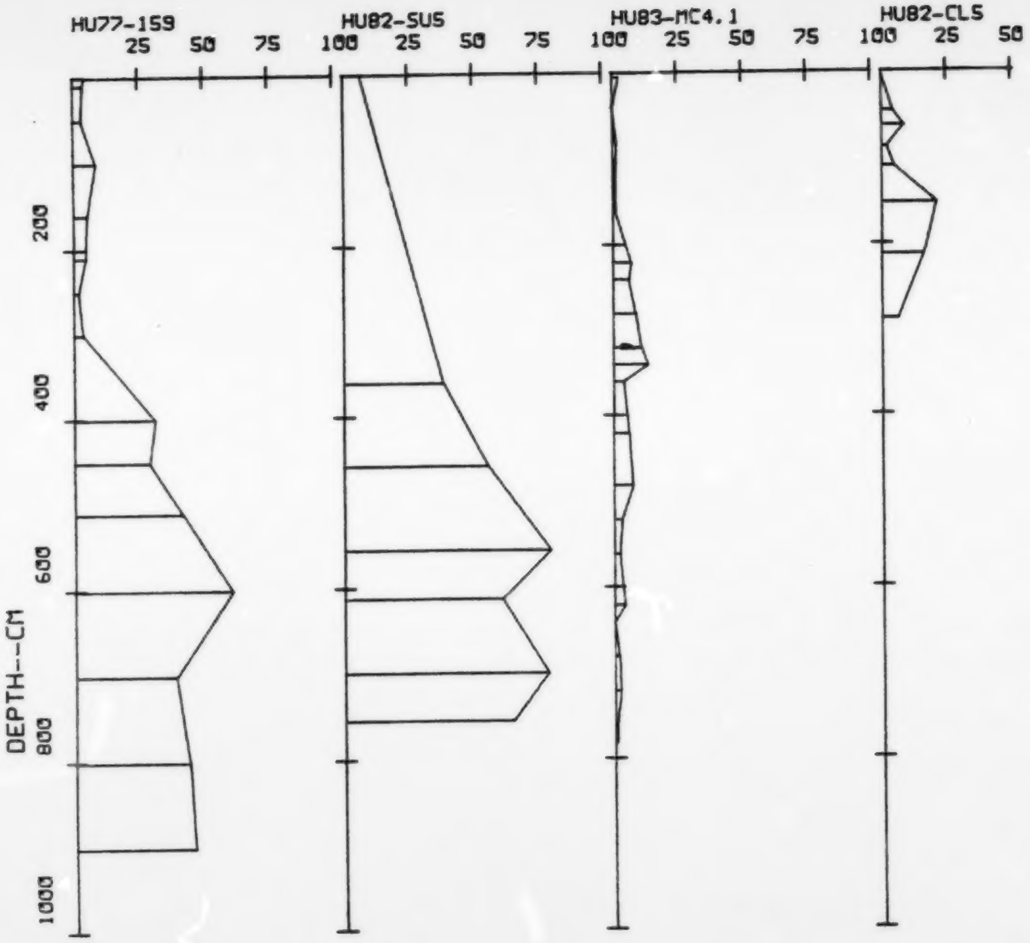

Figure 3. Downcore variations in the percentage of Pre-Quaternary pollen in the total count of pollen (Short and Mode, unpubl. data).

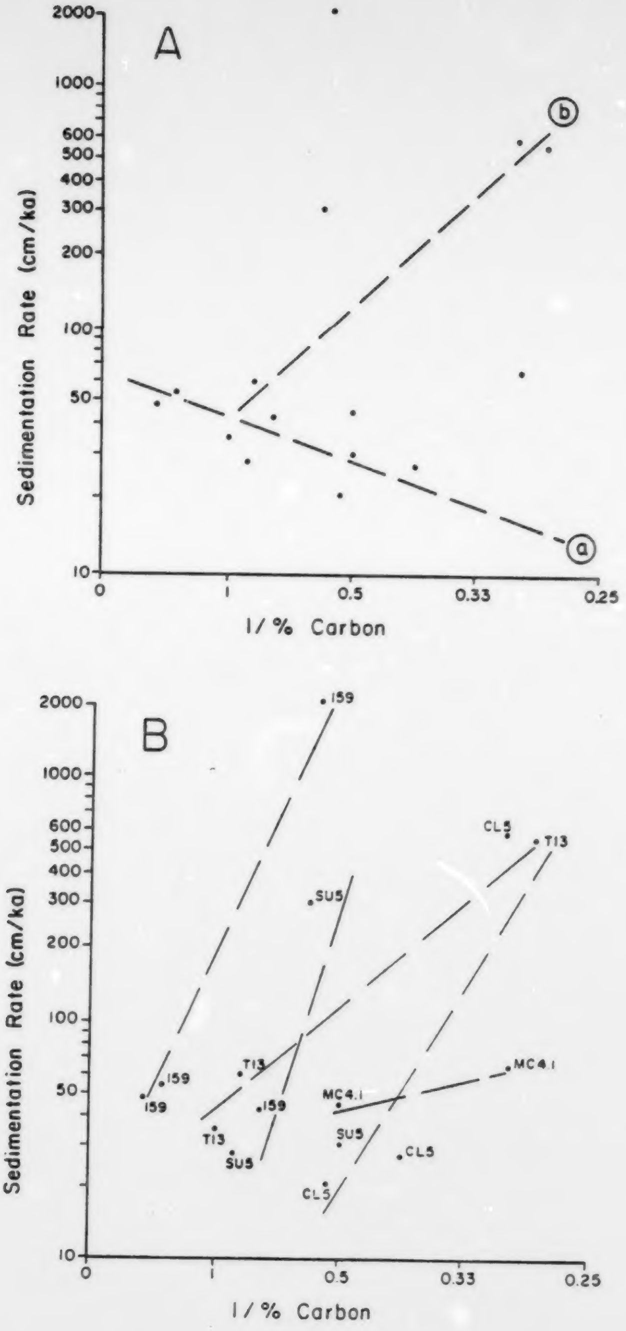

Figure 4A. Scatterplot of 1/%Carbon versus sedimentation rate, showing two possible alternative relationships.

B. Same data as in Fig. 4A but with the actual cores delimited and showing a positive series of relationships.

CHAPTER 13

Organic Geochemistry of Baffin Island Fjords

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ABSTRACT

Seven fjords, representing a cross-section of characteristics with respect to hydrography, inputs and morphology have been utilized in this study to qualify and distinguish the sources and fate of organic matter. Low level organic terrigenous inputs derived from Arctic tundra vegetation are readily resolved from more organic rich marine sources through stable isotopic and bound amino acid compositions of sedimentary organic matter. Increasing enrichments in amino acid content (8 umol/g to 26 umol/g) as well as ^{15}N and ^{13}C stable isotopic abundances (+4 o/oo to +10 o/oo and -25 o/oo to -21.5 o/oo, respectively) are observed seaward of fjord heads. As a result of increased kinetic isotopic fractionation attributed to temperature effects, two separate marine organic sources, macrophytic algae and marsh plants, can be distinguished from the normal marine planktonic endmember. The fjord sediments are more enriched in ^{15}N than Mid-Atlantic Coast shelf sediments. This difference may reflect extensive fertilizer input to the ocean along the Mid-Atlantic Seaboard. Relative amino acid abundances also appear to be useful for identifying sources of organic matter preserved in these sediments.

INTRODUCTION

Fjords are inlets which form as glaciers descend along coastlines and, as the glaciers recede, are inundated by seawater (Thornburry, 1967). They are both an interface and buffer between the continents and oceans (Schafer, in Syvitski and Blakeney, 1983). Sediment sources of fjords can be both marine and terrestrial. Analysis of the organic components of the sediments from the fjords can be used to explain processes operative in the present as well as the past.

This paper makes use of stable carbon and nitrogen isotopes to study the organic matter found in the sediments of several Baffin Island fjords. The purpose of this study is two-fold: 1) to define the sources of the organic matter within the sediments and 2) to resolve early diagenetic changes that have taken place in the organic matter during burial.

Hydrolysates of sediment samples from the fjords of the eastern Baffin Island were also analysed for amino acids in order to further define organic diagenetic processes and trace possible sources of organic matter. The variation in total amino acid and amino acid components with depth and with distance from fjord head were examined. An attempt is made to define terrigenous and marine dominated end-members within the fjords in terms of amount of amino acids and variation of the Asp/Glu, Gly/Ala, and Phe/Tyr values. The terrigenous end-member tended to have relatively low Asp/Glu, Gly/Ala, and Phe/Tyr, whereas marine values of these ratios were high, thus defining a mixing relation for the source of the organics.

Stable carbon and nitrogen isotopes were used in this study to define the sources of sedimentary organic matter in Baffin Island fjords. Calving glaciers, and glacial and non-glacial streams were the major suppliers of terrestrial detritus to these areas. Plankton were the major contributors from the sea. Because carbon and nitrogen follow independent isotopic fractionation routes resulting in distinct values for given reservoirs, a dual isotope study can be used to better resolve or confirm the findings of either carbon or nitrogen isotopes.

THE STUDY AREA

The Baffin Island Fjords are of special interest because of their geographical and climatological setting (between latitudes 66 to 72 degrees N and longitudes 60° W and 76° W). They represent environments in which the impact of seasonal and long term climatic variations on the developments of local marine plant and animal populations are expected to be relatively pronounced (Schafer, in Syvitski and Blakeney, 1983). These characteristics enhance their potential as field laboratories for investigating problems in organic geochemistry.

The fjords chosen in this study reflect a spectrum of contrasting conditions including drainage basin size, glacier development, tidal conditions, delta morphologies, sediment inputs, maximum water depth and number of sills (Trites, in Syvitski and Blakeney, 1983).

METHODS

Cores collected during the 1982-83 expeditions of the Hudson to Baffin Island (Table 1) were subsampled and frozen. The procedure used to prepare the sediments for isotopic analysis is essentially a modified Dumas method (Macko, 1981). The sediments were acidified with 30% HCl to remove carbonate and dried at 40° C.

The sediments were weighed and mixed with coarsely ground cupric oxide wire (BDH chemical) and granular copper metal (Alpha Resources Inc.) in a volume ratio of approximately 5:5:1. The quartz combustion tubing (approximately 30 cm in length and 1 cm in diameter) and copper oxide were initially purified by precombustion for one hour at 500°C and 900°C, respectively. The quartz tubes containing the samples were evacuated, sealed and samples homogenized. The tubes were then combusted step-wise at each of 850°C, 650°C and 550°C for one hour and cooled down before removal from the furnace. The combustion products, N_2 and CO_2 gases, were cryogenically purified and collected. The carbon and nitrogen isotope compositions were determined by introducing the purified N_2 and CO_2 gases respectively into the mass spectrometer (V.G. Micromass 903E). Isotopic compositions are reported as δ values:

$$\delta = \frac{R\ \mathrm{sample}}{R\ \mathrm{standard}} - 1 \times 10^3$$

where R = the abundance ratio of the heavy to the light isotope.

The $\delta^{13}C$ values are reported relative to PDB. A tank of carbon dioxide substandard (-41.16 o/oo) was actually used in the laboratory. The $\delta^{15}N$ values are reported relative to atmospheric nitrogen. A tank nitrogen substandard (1.11 o/oo) was used in the study.

For amino acid analyses approximately 100 mgs of dried sediment was weighed into a digestion tube. To each sample, exactly 1 ml of high purity 6N HCl was added, and then was sealed under nitrogen. The samples were then digested at 100°C for exactly 24 hours. The acid liquor was evaporated to dryness under a stream of dry air. The residue was then dissolved and then injected into the amino acid analyser.

Separation of the amino acids was by ion exchange chromatography, with post column derivatization with ortho-pthalaldehyde (OPA) and fluorescence detection and integration. A cation exchange HPLC was used for separation (3 micron resin, 6.95 cm column, 2 mm). Detection was achieved by an HTV Instrumentation Fluoroflow detector 10. The output was displayed by a Hewlett-Packard 3390A Integrator and Soltec S-4204 Chart Recorder.

Results and Discussion: individual studies

North Pangnirtung: NP2

North Pangnirtung has only one terrestrial input, a glacial stream at its head (Syvitski and Blakeney, 1983). The 225 cm LeHeigh core used in this study was taken about 24 km from the head at a depth of approximately 347 m.

The constancy of both $\delta^{13}C$ (-22.4 o/oo to -21.3 o/oo) and $\delta^{15}N$ (8.7 o/oo to 9.8 o/oo) indicated a single source for the organics in the sediments. A marine input dominated by phytoplankton contributions is suggested by these values. The % C (.25-.43) and % N (.033 - 0.51) are relatively high compared to the other fjords and also extremely constant with depth.

In downcore studies the $\delta^{15}N$ values showed a trend of continuing degradation of the organics with depth as seen by the enrichment of about 1o/oo downcore. At a depth of 150 cm, a slight depletion in all four parameters indicates an increased contribution to the sediments from a more depleted source. Because terrestrial inputs are usually lower in organics than marine inputs, an increased contribution from the land is proposed. Increased runoff from the glacial stream, sudden slump or turbidite currents, or icerafting are all possible sources for the depleted material. The latter proposals may be the more probable since only one stream enters the fjord several kilometers from the core site and no calving glaciers are present in North Pangnirtung. (Syvitski and Blakeney, 1983).

The core shows a very high value of total amino acids in the surface layer (total amino acid = 25.9 micromoles per gram) which rapidly increases with depth and increases slightly again at 75 cm and then decreases slightly again at 75 cm and then decreases from 14.7 micromoles per gram to 6.3 micromoles per gram at 100 cm and remains relatively constant downcore. This pattern may be the result of biological degradation and or diagenesis.

The neutral amino acid fraction is fairly high and increases slightly downcore. The aromatic and basic fractions are relatively low. The aromatic fraction is seen to fall constantly with depth. The acidic fraction is relatively constant and only decreases noticeably at a depth of 175 cm, corresponding to an increase in the aromatic fraction.

The Asp/Glu values are fairly high and, disregarding minor fluctuations, appear constant throughout the core, suggesting a strong marine character. However, there is one anomalously high value at a depth of 150 cm, with a very low Asp/Glu value. This is evidently the result of a chance event such as a storm, causing an increased influx of terrigenous sediments. Phe/Tyr values are also slightly higher supporting the evidence for marine inputs. Gly/Ala values, however, are low indicating reduced biological activity.

Coronation fjord: CO2, CO4

Coronation Fjord is the only fjord still partially covered by the Penny Icecap. The fjord was characterized using two approximately 225 cm LeHeigh cores, CO2 and CO4. CO2 was taken approximately 7.5 km from the icecap at a depth of 248 m. CO4 was taken approximately 25 km seaward of CO2 at a depth of 356 m.

The use of two cores allowed both down-core and down-fjord trends to be examined. The plot of $\delta^{13}C$ versus $\delta^{15}N$ for CO2 and CO4 (Fig. 1) exemplified the terrestrial-marine mixing model. Average $\delta^{13}C$ and $\delta^{15}N$ values of -24.0 o/oo and 5.3 o/oo respectively were found in CO2.

These depleted values accompanied by the lowest % C (0.3-.06) and % N

(.004-.007) values found indicate an organic input dominated by terrestrial detritus. The low organic content may be a result of the extensive icecap.

Further seaward in CO4, the $\delta^{13}C$ and $\delta^{15}N$ values are more enriched on the average by 1.6 °/oo and 2.9 °/oo respectively. The $\delta^{13}C$ values range from -21.6 °/oo to -23.0 °/oo and the $\delta^{15}N$ values from 7.4 °/oo to 9.6 °/oo. Thus the organics in CO4 are dominated by marine planktonic contributions.

Accompanying the isotope enrichments from CO2 and CO4 are large increases in the organic content of the sediments. The % C increases by a factor of 5 whereas the % N increases by a factor of 10. If the heavy isotopes in CO4 had resulted from kinetic isotope fractionation of terrestrial matter the organic content of the sediment would have decreased. This is further evidence that the organics in CO4 are marine.

Downcore in CO2 the % C and % N show a very gradual decrease attributable to continuing degradation with depth. The $\delta^{13}C$ and $\delta^{15}N$ follow the same basic trends and fluctuate less below 120 cm than in the upper core. However, in CO4 both isotopes and percentages vary greatly downcore, yet at 125 cm there is a good correlation between isotope values. This is interpreted as a turbidite deposit.

In CO4 decreases in % C coupled to depletions in ^{15}N at 25 cm, and depletions in both carbon and nitrogen isotopic compositions at 125 cm have been interpreted as turbidites. Directly below these units the typical ^{15}N enrichment and ^{13}C depletion with depth are observed. The increased organic content of the sediments between 25 and 125 cm relative to the surficial sediments may be explained by slowed degradation processes resulting from rapid burial by turbidites.

Similar depletions in $\delta^{13}C$ and $\delta^{15}N$ values are seen in CO2 at 25, 75, 125 and 175 cm. Those at 25 and 125 cm are considered the landward extension of the units found at the same depths in CO4. These have been interpreted as extensive turbidite deposits whereas those at 75 and 175 cm are also considered to be turbidites but ones which did not reach as far down-fjord as CO4.

Core CO2 contains the lowest amounts of amino acids. This may be a result of location, being close to the freshwater entry points; the overall sedimentation in the area in which this core was taken is quite low (Farrow et al., 1985). Thus, the sedimentary organic matter is expected to be derived largely from terrestrial sources. This core is thought to define the terrestrial end-member of all of the cores of the study area.

The surface sediment shows relatively high concentrations of amino acids in this core which decrease from 5.8 micromoles per gram at a depth of 10 cm to 1.3 micromoles per gram at a depth of 50 cm. Amino acid concentrations then decrease rather uniformly and gently downcore (0.6 micromoles per gram at a depth of 225 cm).

The relative percentages of neutral, acidic, basic and aromatic fractions remain fairly constant throughout the core as in the other cores studied. At a depth of 10 cm the concentrations of amino acids are highest.

The Asp/Glu is fairly low (average about 1.1 throughout the core) and displays an apparent inverse relationship to the total amino content. This may be taken as an indicator of low marine algal production and high terrestrial input. Phe, an abundant offshore amino acid (Gonzalez, 1983) is found in relatively low concentrations. The Phe/Tyr values are also very low. Furthermore, the Gly/Ala values are lowest for this core. The low Asp/Glu, Gly/Ala and Phe/Tyr values seem to be a corroboration suggesting a possibly dominant terrestrial sediment input.

Core CO4 has higher concentrations of amino acids than core CO2, although these values are relatively low compared to values from other fjords. Values of total amino acids vary from about 5.5 to about 7.5 micromoles per gram throughout the core except at a depth of 125 cm where the total value peaks at 15 micromoles per gram. This constancy down core suggests a uniform input and preservation of organic material. The maximum may represent increased sedimentation or may be the results of a storm related or glacial depositional event.

The relative percentages of neutral and aromatic acids are fairly low, both being less than 10%. Neutral amino acids are rather abundant (about 72-73% average through the core). At the 125 cm depth there is a sharp increase in the acidic fraction and a noticeable decrease in the basic fraction (corresponding to increased sedimentation). These values seem to indicate increased influx of marine sediments, possibly due to storm related events.

Asp/Glu values for Core CO4 are higher than those for Core CO_2 (values about 1.62 on the average), indicating a stronger marine influence. Similarly the Phe/Tyr and the Gly/Ala values for Core CO4 are higher than those for Core CO2, even though they are relatively low. These values are suggestive of a dominant marine input in Core CO4. The Phe/Tyr value is particularly high in this core. This may be indicative of an abundant benthic community.

Itirbilung Fjord: It 0.4, It 3.1

Itirbiling, like North Pangnirtung is headed by a glacial stream. The fjord is divided into two basins by a sill which rises to a depth of approximately 100 m. Two cores were studied, one on either side of the sill. The core, It 0.4 (124 cm long) was taken approximately 3 km from the head of the fjord at a depth of approximately 155 m. The core It 3.1 (224 cm long) was taken seaward of the sill approximately 42 km from the head in about 365 m of water.

The terrestrial marine mixing model is also demonstrated in this fjord (Fig. 1). The majority of $\delta^{13}C$ and $\delta^{15}N$ values in It 0.4 were depleted relative to all the other fjords except CO_2 and fell within a terrestrial range of -23.7 o/oo to -23.8 o/oo and 5.3 o/oo to 5.9 o/oo, respectively. Seaward in It 3.1, the $\delta^{13}C$ and $\delta^{15}N$ values fell into another narrow range of -22.1 o/oo to -23.8 o/oo and 8.3 o/oo to 9.3 o/oo respectively with the exception of those from 50-75 cm. At these depths a near perfect correlation exists between decreasing % C, % N, $\delta^{13}C$ and $\delta^{15}N$ values. This has been interpreted as an increase in the terrestrial input to the fjord resulting from an increase in stream runoff or a massive slump or turbidite deposit. Most of the $\delta^{15}N$ values in It 3.1 indicate marine planktonic inputs whereas the $\delta^{13}C$ values indicate a mixing of marine and terrestrial organics.

The depleted $\delta^{13}C$ values may be explained by input from calving glacier located between the two core sites. Terrestrial sediments released from the melting glacier would contain organics very depleted in $\delta^{13}C$ (-24 o/oo to -25.0 o/oo) as seen in CO2. These mixed with the marine inputs would give the observed $\delta^{13}C$ values. However, as seen in CO2, the organic nitrogen from a calving glacier would be neglible and thus would not overprint the marine $\delta^{15}N$ values as seen. The seaward enriching isotope values are accompanied by increasing organic carbon and nitrogen contents from 0.29 - 0.65 % C and 0.02 - 0.071 % N in It 0.4 to 0.20 - 0.85 % C and 0.22 - .11 % N in It 3.1.

The downcore profiles of It 0.4 and It 3.1 show little overlap. The shallow sill separating the two basins where the cores were taken may be responsible. In It 0.4 the carbon values remain relatively constant and show the decay trends seen in the other fjords. Laminated sediments at 20 cm and 40 cm depth correlated with depleted isotope values and decreased organic percentages relative to the surrounding sediments. These sediments were interpreted as turbidites which did not extend to It 3.1 as a result of the intervening sill. The % N decreased with depth whereas the $\delta^{15}N$ appeared to become more depleted.

In It 3.1 the degradation trends are seen below 75 cm i.e., decreasing organic contents are accompanied by depleting $\delta^{13}C$ values and enriching $\delta^{15}N$ values with depth. The sediments from 50 - 75 cm are severely depleted in both isotopes and have less organic content. An increase in terrestrial input from the calving glacier in response to a temporal warming trend may explain the anomaly.

Core IT.4, like Core CO2, is expected to reflect terrigenous inputs because of its proximity to land (Farrow et al., 1985). The total amino acids are relatively abundant in the surface layers, up to 8 micromoles per gram in the surface sediments, and decreasing rapidly to lower values (between 3 to 4 micromoles per gram). This appears to be the result of biological degradation and diagenesis. The distribution of total amino acids strongly resembles that of Core CO2.

Like Core CO2, the relative percentages of neutral amino acids is low and the percentages of basic and aromatic acids are relatively high. (It should also be noted that the relative percentage of acidic amino acids seem to be constant between 25 and 30% in all cores from all the fjords). At a depth of 25 cm there is a marked change in the relative percentages of the different amino acid fractions; neutral amino acid percentage values fall from 57% at 20 cm to 47% at 25 cm and then increases to 53.3% at the 40 cm.

This is accompanied by a correspondingly noticeable increase in the acidic fraction, from 24.0% at 20 cm to 27.0% at 25 cm and then fall to 23% at 40 cm. A less severe change is observed in the basic fraction (an increase) and in the aromatic component (a decrease).

Asp/Glu values are relatively low, hinting at a possible dominant terrestrial source (average being about 1.4). At a depth of 25 cm there is a noticeable large peak corresponding to the marked change in the relative percentages of different amino acid fractions. This anomaly may indicate a chance event during which there may have been increased sediment input from marine source. The values of Asp/Glu for this core are approximately the same for Core CO2. Phe/Tyr and Gly/Ala values in this core are slightly low suggesting limited biological activity.

Total amino acids in the surface of It 3.1 show an unusually high value, 19.6 micromoles per gram which decreased rapidly to 5.3 micromoles per gram at a depth of 50 cm. The concentrations remained fairly constant to 75 cm and then increased rapidly to 21.3 micromoles per gram at 125 cm, and then declined rapidly to 9.0 micromoles per gram at 175 cm, remaining constant for the rest of the core. This increase and decrease and increase of total amino acids suggest sporadic sedimentation patterns, which may be storm related.

The basic and aromatic fractions are relatively low to a depth of 75 cm, while the neutral fraction is high (reaching up to 75%). Below 75 cm, basic and aromatic fractions increase, as the neutral fractions shows a corresponding decrease. The acidic fraction was fairly high in the surface, but dropped from 30.9% to 25.3% at 25 cm and remained fairly low (less than 25%) until a depth of 200 cm. Asp/Glu show a progressive increase with values which are very low (about 0.95) and fairly constant to 75 cm. Below this, the values increase, reaching relatively high values, the maximum being 1.8. The Phe/Tyr values are average and relatively constant throughout the core, increasing slightly with depth. The Asp/Glu and Phe/Tyr values suggest that in the upper 75 cm of this core terrestrial matter is dominant, but becomes diluted as the depth is increased beyond 75 cm. Gly/Ala values are relatively high. This evidence may be the result of a high populaton of bottom dwellers.

Cambridge fjord: Ca3, Ca6

Cambridge was studied using a grab sample, Ca3, and a 250 cm LeHeigh core, Ca6. Both were taken in the second basin from the head of the fjord. Inputs to this basin may have originated from a nonglacial stream at the head of the fjord, glacial and nonglacial streams along the fjord, a tributary fjord, and calving glaciers (Syvitski and Blakeney, 1983). The Ca3 grab was taken approximately 27 km from the fjord head at a depth of 366m. Ca6 was taken approximately 29 km seaward of Ca3 in 640 m of water.

The isotopes indicate a marine planktonic origin for the organics, with $\delta^{13}C$ values ranging from -21.6 o/oo to -22.5 o/oo and the $\delta^{15}N$ values ranging from 8.1 o/oo to 9.0 o/oo. At 100 cm and 225 cm the $\delta^{13}C$ and $\delta^{15}N$ values of -21.6 o/oo to -22.0 o/oo, and 6.8 o/oo to 7.1 o/oo indicate a partial influence of macroalgae. Isotope values in Ca3 also suggest a macrophyte origin.

A macrophyte community may exist on the shallow upper slope of this basin. Occasionally slumps or turbidites may move sediments from this area to deeper parts of the basin. This may explain the isotopically depleted and slightly organic enriched sediments at the 100 cm and 225 cm depths in Ca6.

Downcore, with the exception of possible turbidite deposits at 126 cm and 225 cm as indicated by depleted $\delta^{15}N$ values, the sediments become depleted in ^{13}C and enriched in ^{15}N. The % N values also show the typically depleting trend with depth whereas the % C values increase slightly.

This fjord is thought to represent the Arctic end-member. The values of total amino acids are relatively high in this fjord. In comparing the grab sample Ca3 and Core Ca6, total amino acids are seen to increase with increasing distance away from fjord head. The neutral amino acid fraction is very high, being greater than 60% throughout most of the core. The basic and aromatic fractions are very low. The basic fraction is less than 10% for most of the core.

The Asp/Glu values are low at the upper layer of the Core Ca6, and increase steadily with depth, except at depth of 150 cm. Values range from 1.2 to 1.6 which are all relatively high. The Phe/Tyr values are also high. Both Asp/Glu and Phe/Tyr indicate a dominant marine influence. Finally, the Gly/Ala values are abnormally high suggesting increased biological activity.

Maktak Fjord: Ma2

An approximately 250 cm LeHeigh core, Ma2, was used to characterize Maktak. It was taken landward of the Coronation junction at about 11 km from the head of Maktak in 257 m of water.

The downcore isotope values indicate two sources for the organics. The majority have typical marine planktonic with $\delta^{13}C$ and $\delta^{15}N$ values ranging from -21.5 o/oo to -22.6 o/oo and 8.8 o/oo to 9.6 o/oo respectively. From 25 - 75 cm the ^{15}N values drop noticeably by approximately 2 o/oo. A slight depletion of the $\delta^{13}C$ values, as well as an increase in the organic content was also observed. These isotope values fall within the range of macrophytic algae and may represent a period in which conditions were more favorable for algal growth in this region. Below 75 cm the decrease in the concentration of organics is accompanied by an expected depletion in the $\delta^{15}N$ and $\delta^{13}C$ values. This trend is broken at 142 cm by a sharp decrease in the % C and % N values and a depletion in the $\delta^{13}C$ values. This has been interpreted as a turbidite deposit.

This fjord shows relatively high total amino acid values at the surface, which decrease almost steadily downcore. The lowest total amino acid value (5.4 micromoles per gram) is at a depth of 142 cm, which increases slightly with increasing depth. This pattern is somewhat similar to that produced by biological degradation and diagenesis.

Neutral amino acids percentages are relatively lower, compared to values from other cores, with a noticeable depression from about 120 to 155 cms. The aromatic and basic fractions are also slightly low, and show the opposite trend of the neutral amino acids.

Asp/Glu and Phe/Tyr values are fairly high in this core. The Asp/Glu value is lowest at a depth of 100 cm. This correlates with a low Phe/Tyr value at that depth suggestive of a major terrestrial input probably due to a storm related event. The Gly/Ala values are fairly low, indicative of reduced biological activity.

McBeth fjord: Mc2, Mc4.1

McBeth is subdivided into two basins by a sill which reaches a depth of approximately 90 m and is located about 20 km from the head of the fjord. Two cores, Mc2 and Mc 4.1, were studied. The 198 cm core, Mc2, was taken approximately 3 km landward of sill in about 320 m of water. The 200 cm core, Mc 4.1, was taken approximately 46 km from the head in approximately 549 m of water.

The average $\delta^{13}C$ and $\delta^{15}N$ values in Mc2 were -24.1 o/oo and 7.3 o/oo respectively. This unusual combination may be explained if the marsh at the head of the fjord is considered the dominant supplier of organics. In a study of a saltmarsh in Maine (Macko, unpublished) the $\delta^{13}C$ values of the sediments were found to be depleted relative to the plant whereas the $\delta^{15}N$ values were found to be approximately the same. This indicated that the carbon of the plant was rapidly degraded and isotopically fractionated relative to the nitrogen. As a result, the depleted $\delta^{13}C$ values in McBeth can be attributed to large quantities of marsh detritus being flushed into the fjord along with other terrestrial sources. The $\delta^{15}N$ values are enriched relative to terrestrial inputs and are probably the result of mixing of terrestrial detritus with the more enriched refractory nitrogen component from the marsh plants and marine planktonic detritus. The high % C values also point to a large source of organics in addition to the normal terrestrial and marine inputs.

The $\delta^{13}C$ values in Mc 4.1 spanned a narrow range of -23.0 °/oo to -23.7 °/oo unlike the $\delta^{15}N$ values which ranged from 6.1 °/oo to 8.8 °/oo. With the exception of the sediments from 50 - 100 cm, the isotopes can be explained as resulting from mixing between marsh organics and marine organics. The depleted sediments between 50 - 100 cm indicate that the terrestrial input was increased. An increase in the output from calving glaciers located between the two core sites may be the answer.

Unlike Coronation and Itirbilung, a plot of $\delta^{13}C$ and $\delta^{15}N$ did not reveal the normal terrestrial-marine mixing trend. Instead, the $\delta^{15}N$ values for all samples are quite similar and the $\delta^{13}C$ values showed an enrichment seaward of only 1 °/oo. An explanation is that the $\delta^{15}N$ values for the two end-members of the system i.e., marsh plants and marine algae are not noticeably different, the $\delta^{13}C$ values for the terrestrial end-member have been altered or the organic matter in both cores originates from the same source. In contrast, in Coronation and Itirbilung, there was a $\delta^{15}N$ enrichment of approximately 3 o/oo from the terrestrial to the marine end members. But instead of an increase in $\delta^{15}N$ values with increasing $\delta^{13}C$ values, the two cores of McBeth plot within the same general field.

The difference in the $\delta^{13}C$ values between the two cores may also have been depressed by the additional input of depleted terrestrial matter to Mc4.1 from the calving glaciers located downward from Mc 2. This depression of $\delta^{13}C$ as a result of inputs from glaciers downstream from the fjord head was also seen in Itirbilung. Coronation is the best example of a true mixing model of the fjords studied because it has only one terrestrial source with a large output and one marine source.

Downcore Mc 2 showed much greater fluctuations than Mc 4.1 in all parameters except $\delta^{15}N$. At 50 cm depth in Mc 2 enrichments in the isotopic composition may signify an increase in the marsh or marine input during this period. In Mc 4.1 a large downcore depletion of 2 o/oo depletion in $\delta^{15}N$ occur from 50 - 75 cm. This, once again, indicates an increased terrestrial input to the sediments during this period.

Mc2 contained higher amounts of terrestrial organic carbon. The total amino acids in the surface of the sediment are high (about 11 micrograms per mole) and relatively constant. At a depth of 125 cm however, this value has a peak of 19.5 micromoles per gram, which then falls to 10.4 micromoles per gram at 200 cm.

The neutral amino acid fraction in this core is quite high (from about 65 to 57.5%). The basic and aromatic fractions are quite low whereas the acidic fraction is as high as in the other cores (from 23.7 to 26.3).

Asp/Glu value are fairly low indicating a possible dominant terrestrial source of organic matter, with the exception of the value of 14.8 at 100 cm.

In this core the highest total amino acid peak corresponds to the lowest Asp/Glu peak and the second lowest Phe/Tyr value, again suggesting terrestrial input, probably slump or turbidity deposit. Gly/Ala values are constant and are in the middle of the distribution.

MC 4.1 showed a stronger marine influence throughout the core. MC 4.1 has relatively lesser amounts of total amino acids. The values of total amino acids remain constant throughout the core, indicating a uniform sediment input and preservation as in Core CO4. The neutral amino acid fraction is fairly high, (values range from 55% to 64%), whereas basic and aromatic fractions are relatively low.

Asp/Glu and Phe/Tyr are fairly high. The Phe/Tyr values are the second highest values of all cores studied (second to those values of Phe/Tyr for Su5). This core appears to be predominantly marine in nature, except at a depth of 100 cm, where both Asp/Glu and Phe/Tyr are comparatively low, reflecting a possible high terrestrial input. This may be due to a storm related event. The constant Gly/Ala values may be due to the same types of bottom community as in MC2.

Sunneshine fjord: Su 5

Sunneshine was characterized using an approximately 200 cm LeHeigh core, SU5, which was taken about 17 km from the head of the fjord in 155 m of water (Fig. 2).

The δ^{13}C values range from -20.7 o/oo to -22.0 o/oo whereas the δ^{15}N values range from 6.5 o/oo to 8.7 o/oo. The ranges of both isotopes could indicate a mixing between terrestrial and marine organics but low level terrestrial inputs to Sunneshine make this unlikely. If the organics have originated solely from marine planktonic inputs then the slightly depleted δ^{15}N values must be accounted for. The most probable explanation is that another source is contributing large quantities of organics to the sediments along with the marine plankton. The shallow faunal assemblages in Sunneshine are very similar to others found in kelp-associated regions (Farrow, et al., 1985). This coupled to the high organic content of the sediments (the highest of the fjords studied) indicates that a macrophyte community may be present in Sunneshine.

The downcore studies in Sunneshine indicate that below 100 cm a very slow decrease in % C and % N is accompanied by a depletion in ^{13}C and an enrichment in ^{15}N. Degradation processes which remove the more liable ^{13}C compounds from the sediments leave behind a more refractory ^{13}C depleted fraction, i.e., lipids and a more ^{15}N enriched substrate. This may explain the observed trend.

From 50 - 75 cm depth a noticeable enrichment of ^{13}C, depletion of ^{15}N and two-fold increase in the % N occurs. These factors indicate that different environmental conditions prevailed in the fjord during this period of deposition. A change to conditions which would favor an increase in the size of the macrophyte community or a greater preservation potential in the sediments, such as a period of increased suboxic conditions, may have occurred. An increase in the frequency or severity of storms, or an increase in ice rafting could also account for these trends by increasing the quantity of algal input to the sediments by uprooting the plants and scouring the rocks.

This fjord represents the tidal dominated end-member. The amino acids are very abundant in the upper layers of this core and fall steadily, from 20 micromoles per gram to 10 cm to 9 micromoles per gram at 150 cm, and then remain constant. This reflects high sedimentation rates and biological production and degradation and diagenesis downcore.

The neutral amino acid fraction is fairly low (from 55 to 60%), whereas the basic and aromatic fractions are relatively high.

The Asp/Glu and Phe/Tyr values are high. Of particular interest are the abnormally high values of Phe/Tyr and Gly/Ala values. The three ratios show very good correlation throughout this core and provide strong evidence for a dominant marine source, which becomes more influential downcore. These values are expected since Sunneshine is the only fjord studied that is without an input stream. Furthermore, there may be significant contributions of organic matter from the abundant algae in the fjord.

Discussion

The sources of organic matter

The stable carbon and nitrogen isotope study revealed four major sources for the organics found in the marine sediments: marine plankton, terrestrial detritus, macrophytic algae and marsh detritus.

Most of the cores studied lie directly on a terrestrial-marine mixing line (Fig. 2) of which Coronation (CO2) may be considered the best terrestrial end-member and North Pangnirtung the best marine end member. All other cores studied except SU5 and Mc 2 lie in between and are therefore representative of the varying degrees of terrestrial mixing on the sediments. In general the greater the influence of terrestrial detritus, the more depleted the sediments become in ^{13}C and ^{15}N.

Sunneshine and McBeth have unique associations that are responsible for their unusual isotope ranges. A marine macro-algae community appears to be responsible for the enriched $\delta^{13}C$ values in Sunneshine. A marsh is considered responsible for the depleted $\delta^{13}C$ values in McBeth.

It should be noted that the isotope ranges lie within broader ranges summarized by other authors (Macko, 1981; Entzeroth, 1982) as applicable to other marine environments. It is noteworthy that the $\delta^{13}C$ values in the Baffin fjord sediments lie toward the depleted end of these ranges. This depletion may have been induced by the cold temperatures of the Baffin environment. The $\delta^{15}N$ values found lie toward the more enriched end members of the suggested $\delta^{15}N$ ranges. The Baffin fjord sediments may represent "natural" organic inputs to the fjords without the overprinting of sewage sludge and fertilizers from land runoff seen in the more industrialized regions.

The importance of the dual isotope study is also noteworthy. If this study had used only $\delta^{13}N$ values to correlate source origin to sediment organics no distinction would have been seen between the marsh and macroalgal communities. Likewise, if only carbon isotopes had been used, the marsh sediments would have been isotopically indistinguishable from the glacial meltwaters at the head of Coronation.

The quantity of organics found in the fjord sediments reached maximum values of 0.85% C and 0.267% N. In general, as the percent carbon increased the percent nitrogen also increased (Figure 3). The sediments in Sunneshine and McBeth contained the largest percentages of organics found. These values were easily explained once a high concentration of an organic source was found in each fjord, i.e., macrophyte algal beds and salt marsh plants respectively.

In general, the organic content of the sediments increases as the isotopic signature shifts from terrestrial to marine. This seaward trend may be explained in several ways:

1) The quantity of organic carbon and nitrogen is greater in marine than terrestrial sources;

2) Inputs from terrestrial sources along the length of the fjord are

additive, i.e., the greater the number of calving glaciers, tributary fjords, glacial and nonglacial streams upstream from the sediments the greater the organic content and/or;

3) Changes in the physicochemical environment downstream allow for greater deposition of organics.

From the available data it is possible that all these factors may influence the observed change. A lower organic content of the terrestrial inputs is probable when one considers the sparse terrestrial vegetation found upon recently glaciated terrains. With the exception of marsh and Arctic tundra vegetation in McBeth, no other source of terrestrial vegetation is noted. In McBeth the organic content of the sediments increased landward unlike the seaward increases observed in Coronation and Itirbilung. A high organic output from the salt marsh seems a likely explanation for the opposing trend. The second explanation is also probable but could not be the sole explanation especially for fjords such as Coronation that have a seaward increase in organics but lack tributaries of any sort.

Along with the theory of an increased organic content of the marine input, the theory of changing physio-chemical conditions downstream appears to be the most probable explanation. For example an increase in salinity may aid the precipitation of organics. This may explain the trend in Coronation where a seaward increase in surface salinity from 26.52 °/oo in CO2 to 28.27 °/oo in CO4 accompanies the increase in organics (Syvitski and Blakeney, 1983). It should be noted that salinity did not constantly increase seaward in any of the fjords. Freshwater inputs along their lengths from glacial and nonglacial streams, tributary fjords and calving glaciers may be responsible.

Decreasing flow volume down-fjord or from fjord-to-fjord may also provide an explanation for this trend. Coronation has the highest flow and the lowest organic content. Maktak with a flow 25% that of Coronation has higher organic content as has North Pangnirtung and Itirbilung with volume 10-12% that of Coronation (Syvitski, per. comm.). The greater the flow the less likely small organic-rich particles can settle to the basin floor. As flow volume decreases down-fjord the quantity of organics from both terrestrial and marine origin settling to the bottom increases. Because organics are better preserved in finer sediments and these do not come out of suspension until flow rates are relatively low, grain size coupled to flow rates is another important factor to be considered. In another study (Farrow, et al., 1985) the expected relationship between the sand/clay ratio and the % organic carbon was seen in Cambridge, Itirbilung and Coronation. In all three fjords the organic carbon content was seen to increase seaward, which was thought to be a good indicator of sedimentation rate.

Diagenesis

Downcore variations in these Holocene sediments have been attributed to turbidites and diagenetic changes. In general, the decreasing organic content with depth is explicable by continued microbial degradation after burial. Depletion of $\delta^{13}C$ values accompany this decrease in organics with depth. The selective degradation of the more labile carbon compounds, i.e., amino acids and carbohydrates which are enriched in ^{13}C relative to the lighter lipid fractions is a possible explanation. Their continued degradation results in an increasing depletion of ^{13}C as the relative proportion of lipids in the sediments increases. The general enrichment of the $\delta^{15}N$ values with depth may result from kinetic fractionation processes removing the lighter more easily hydrolyzable nitrogen compounds from the substrate.

In several of the fjords including Sunneshine, Itirbilung, McBeth and Maktak, the downward trends are sharply broken from 50 - 100 cm. Within this region the $\delta^{15}N$ values show depletion of 2 - 3 °/oo indicative of an increase in terrestrial input. In Sunneshine where little terrestrial input is present, the fjord may provide more favorable conditions for macrophyte growth.

Cores from Coronation, Itirbilung and a core and grab sample from Cambridge Fjord all show an increase in total amino acids away from the fjord head (Figure 4). The opposite is seen for cores from McBeth Fjord. This may be due to topographical factors within McBeth Fjord.

Examination of the data reveals the following order of abundance of amino acids: neutral > acidic > basic > aromatic. As shown in the plots of the amino acid fractions, the amino acid composition throughout the individual cores is fairly constant. This uniform amino acid fraction distribution may be explained in terms of degree of preservation of the original organic input and suggests that selective decomposition of peptides and protein is negligible throughout the core. Also the relative abundances of the various fractions of all the cores are fairly similar regardless of amount or type of input. This may suggest major reworking of organic matter by bacteria which are not selective in the decomposition. When the organic matter is available to microbial attack, and there is mechanical reworking, diagenesis is more severe and drastic changes in the total and type of amino acids are produced, as in Sunneshine Fjord. Changes in the total and type of amino acid may also result from a change of source.

From the results, it appears as if there exists differences within different amino acid fraction, to an appreciable extent, enough to distinguish between marine and terrestrial sources. Fairly reliable values include Asp/Glu, Gly/Ala and Phe/Tyr. These values tend to be high in the Arctic marine environment and low in terrestrial organic matter. Glu indicates the level of biological activity within the benthic communities (Degens et al., 1964; Henreichs and Farrington, 1980). Plots of Asp/Glu versus Phe/Tyr and Gly/Ala yield significant linear regression lines (Figures 5 and 6). In Figure 5 Core CO2 appears to be the terrestrial end member, whereas Core CO4 and Ma2 and Su5 are the marine end-members. Core CO2 is again the terrestrial end-member whereas Core CO4, Su5 and Ma2 define the marine end-members. The relative amount of basic amino acids also seem to indicate the source. Marine organic matter, such as that from Sunneshine. Core Su5, Maktak Core Ma2 and Core Itirbilung IT3.1 appear to have lower percentages of basic amino acids.

Within the seven fjords, some cores are mainly terrestrial, while other are mainly marine. The terrestrial end-members appear to be Core CO2 and IT4.1. The marine end-members appear to be Sunneshine, Maktak and Itirbilung IT3.1. Highly significant and significant correlations are observed among the parameters which define these end members (Table 2).

CONCLUSIONS

The stable carbon and nitrogen isotope study on seven Baffin Island fjords revealed that:

1) The isotope composition of the sediments is strongly dependent on the biota living within the fjords which is a function of the hydrographic, topographic and physiochemical conditions.

2) The organics preserved in the fjords depend to varying degrees on terrestrial or marine planktonic organic matter such as the source material.

3) Most cores show an increase in bulk organic content (% C, % N) as well as total amino acids away from the fjord head. This is attributed to low terrigenous organic input.

4) Whereas total amino acid content decreases downcore, relative abundances of the amino acids vary little, indicating little selectivity to one type of amino acid.

5) Abundances of amino acids are neutral > acidic > basic.

6) Highly significant correlations are observed between certain amino acid ratios such as Gly/Ala, Phe/Tyr, Asp/Glu and the isotopic or organic content of the sediment. These correlations indicate that amino acids may be useful as marine vs. terrigenous indicators in restricted input environments such as these fjords. Differences between types of bacterial action may be useful in explaining these observations.

7) In these northern environments, inputs of organic carbon by marine sources is more depleted in the heavy isotope. This difference as well as use of the dual isotope tracer enable improved resolution of sources of organics such as macrophytic algae or seagrasses from other marine inputs.

8) Fjord sediments are more enriched in ^{15}N than Mid-Atlantic Coast shelf sediments. This difference may reflect extensive fertilizer input to the ocean along the Mid-Atlantic seaboard.

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TABLE 1 - CORE LOCATION INFORMATION

	STATION	LATITUDE (N)	LONGITUDE (W)	DEPTH (m)	SAMPLE TYPE
HU82-031:	CA3	71°23.6'	74°40.0'	366	Grab
	CA6	71°34.9'	74°40.0'	640	LeHeigh
	CO2	67°14.1'	64°38.0'	248	"
	CO4	67°15.2'	64°18.2'	356	"
	MA2	67°19.7'	64°33.6'	257	"
	NP2	67°09.5'	64°25.0'	347	"
	SU5	66°33.3'	61°42.6'	155	"
HU83-028:	IT0.4	69°17.9'	69°12.1'	155	"
	IT3.1	69°17.6'	68°12.3'	365	"
	MC2	68°33.5'	69°40.2'	320	"
	MC4.1	69°36.6'	68°44.5'	549	"

TABLE 2 - CORRELATION MATRIX

	GLY/ALA	PHE/TYR	$\delta^{13}C$	$\delta^{15}N$	%N	%C
ASP/GLU	.22*	.21*	.41**	.36**	.17**	.35**
GLY/ALA		.41**	.36**	.41**	.35**	.30**
PHE/TYR			.29**	.08	.34**	.25**
$\delta^{13}C$				.55**	.59**	.16*
$\delta^{15}N$					.34**	.26**
%N						.75**

* = significant (P = 0.95); ** = highly significant (P = 0.99) Pearson R

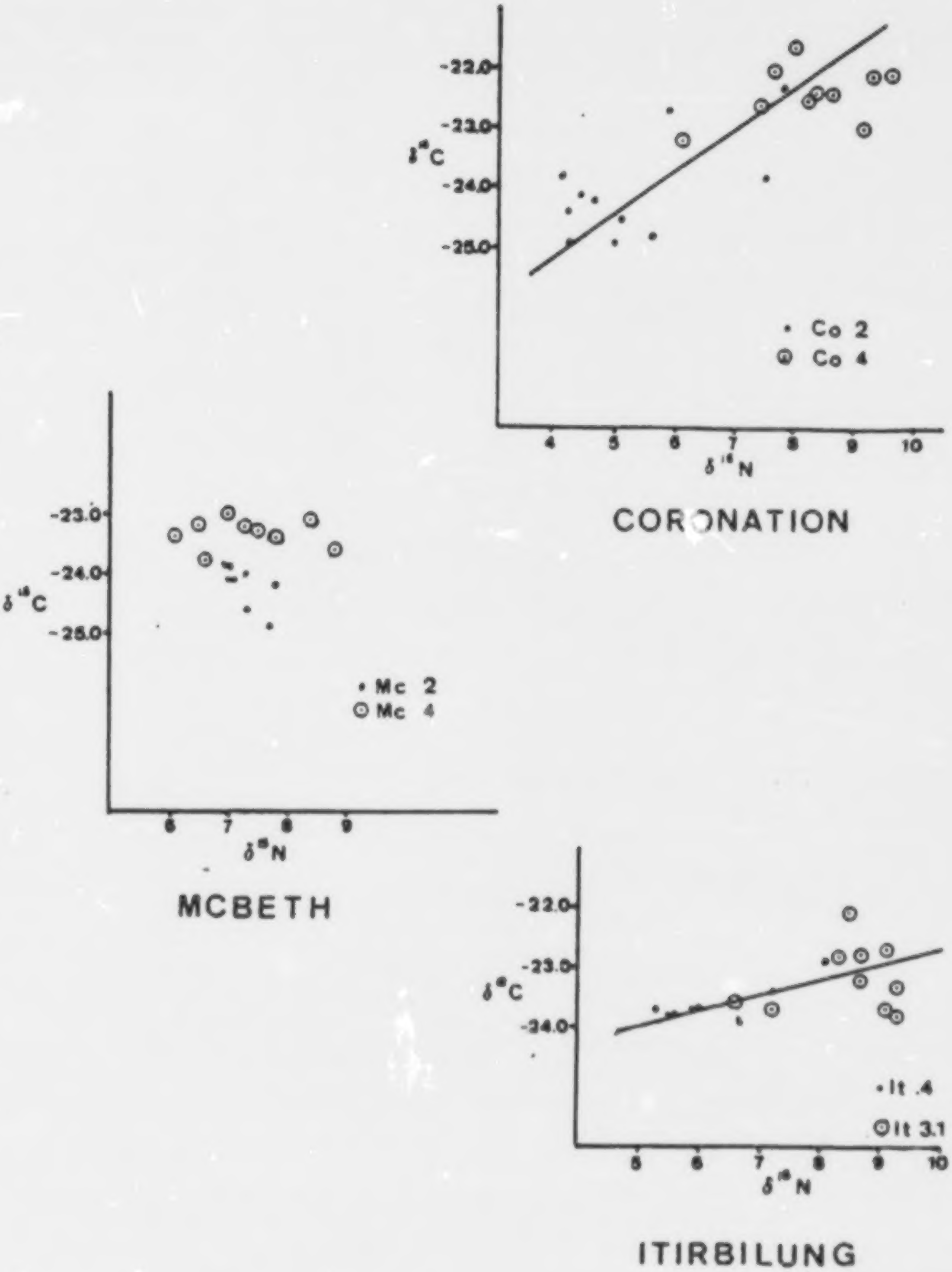

Figure 1. Isotopic compositions of fjords with two stations: Marine-Terrestrial endmembers.

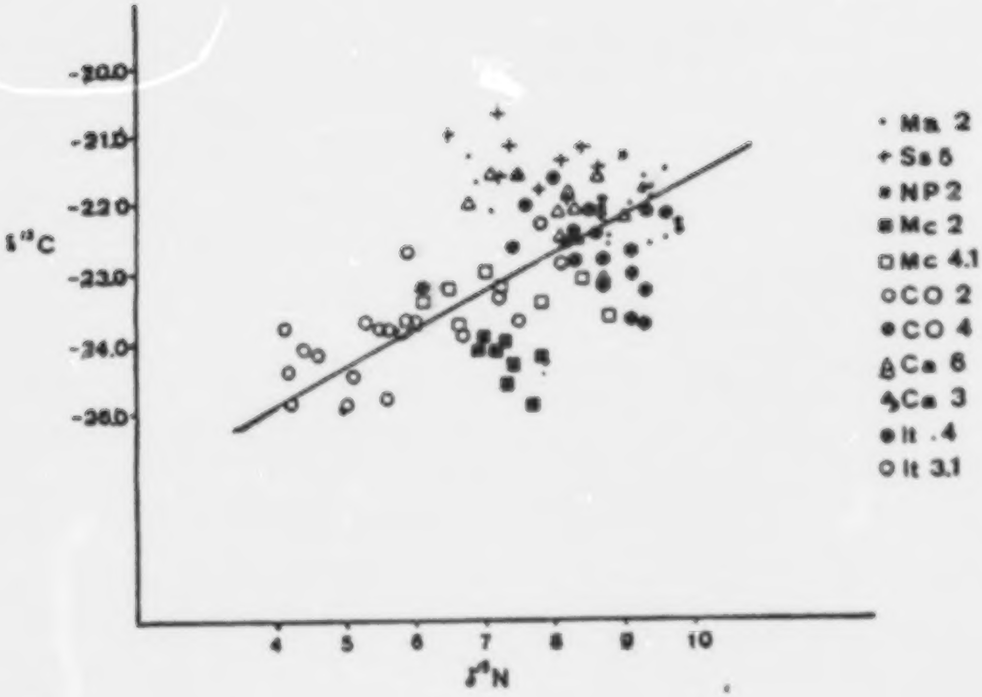

Figure 2. Isotopic Compositions of all samples

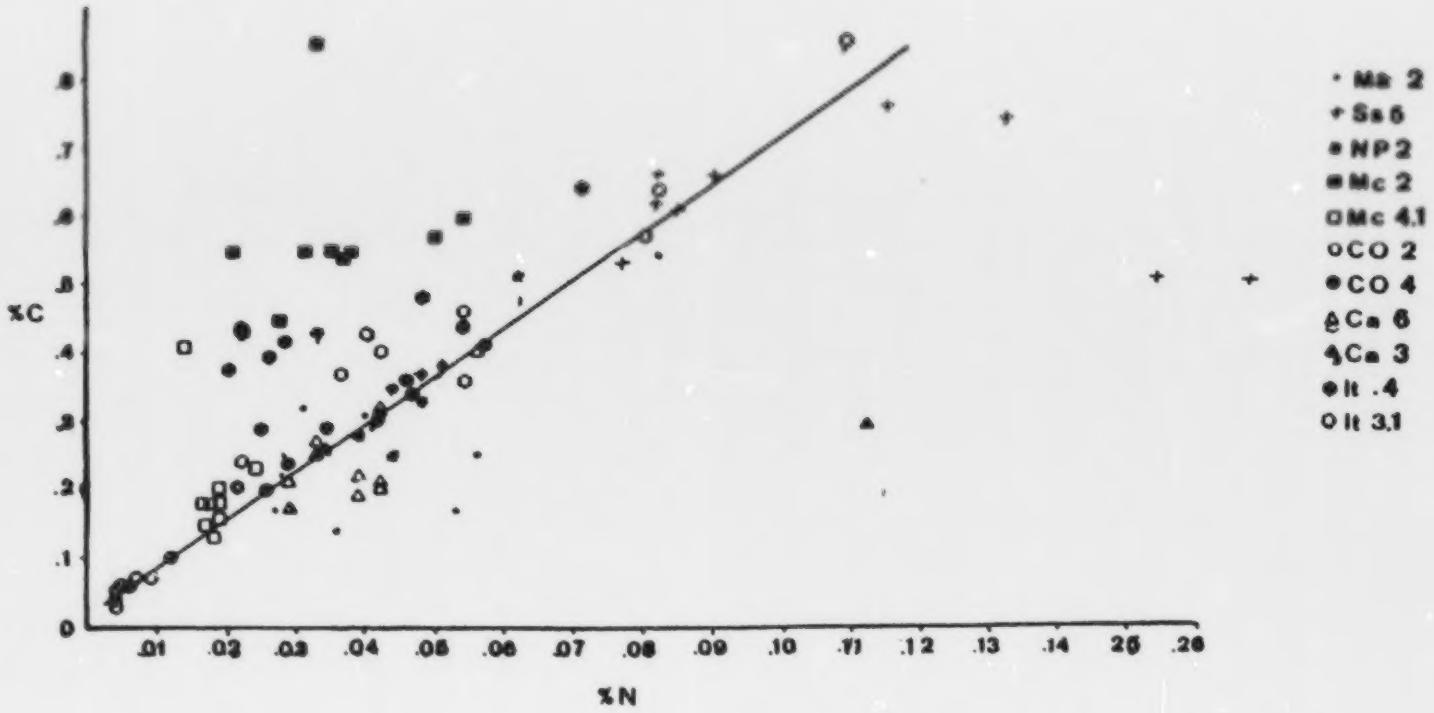

Figure 3. Organic contents of all samples

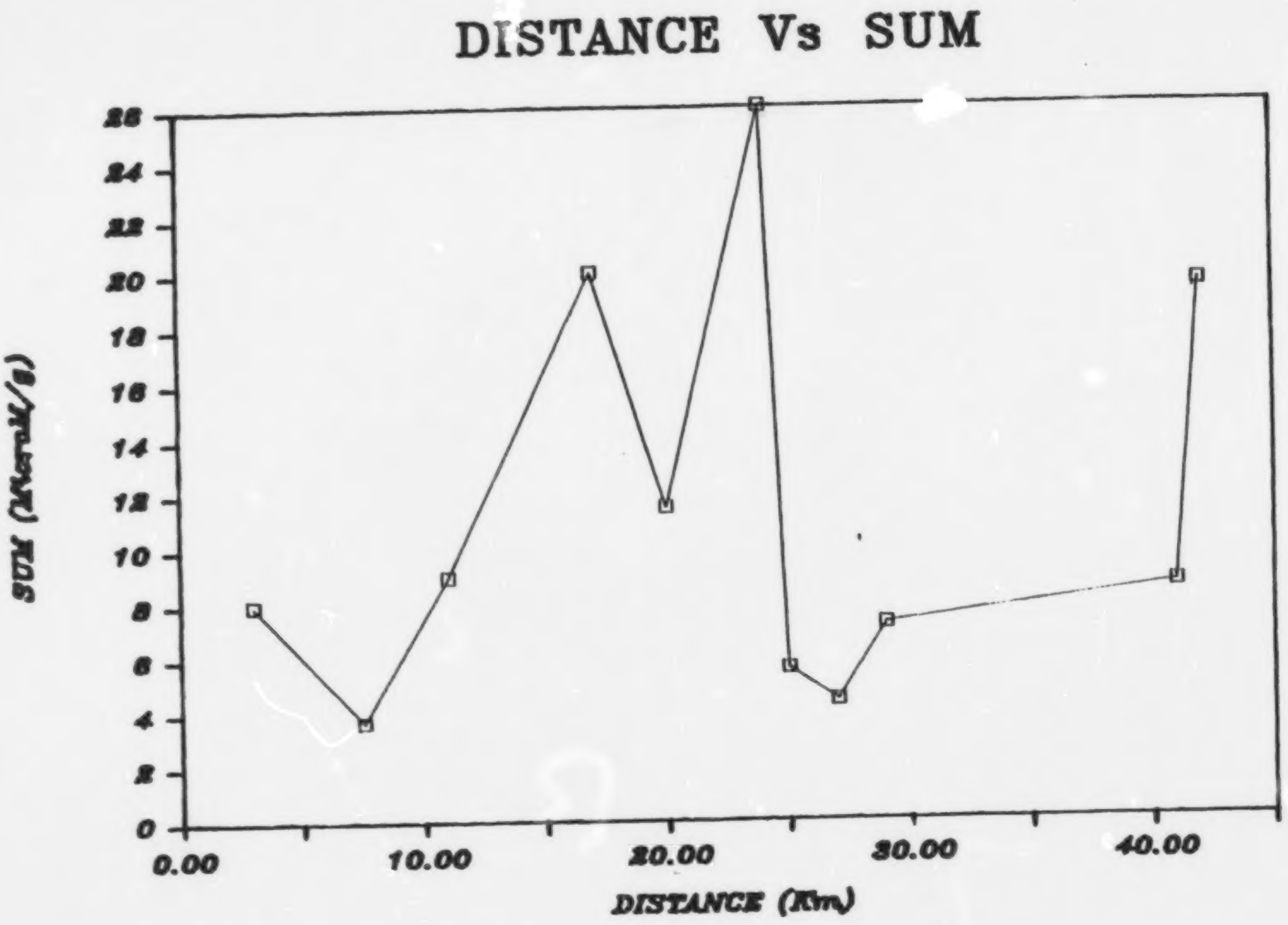

Figure 4. Variation of total amino acid in the surface sediments with distance away from the fjord heads

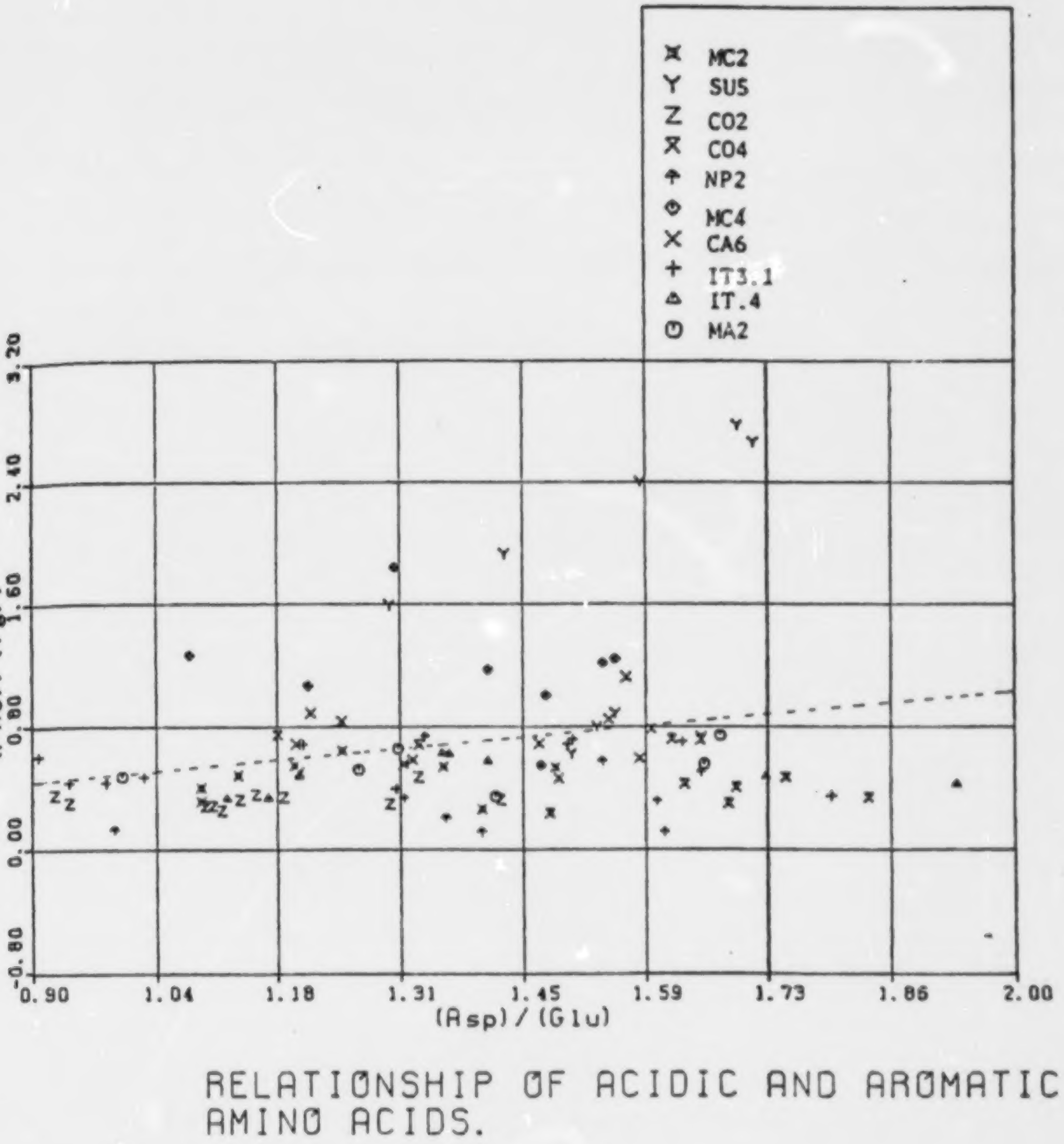

Figure 5. Distribution of Phe/Tyr against Asp/Glu for all the cores

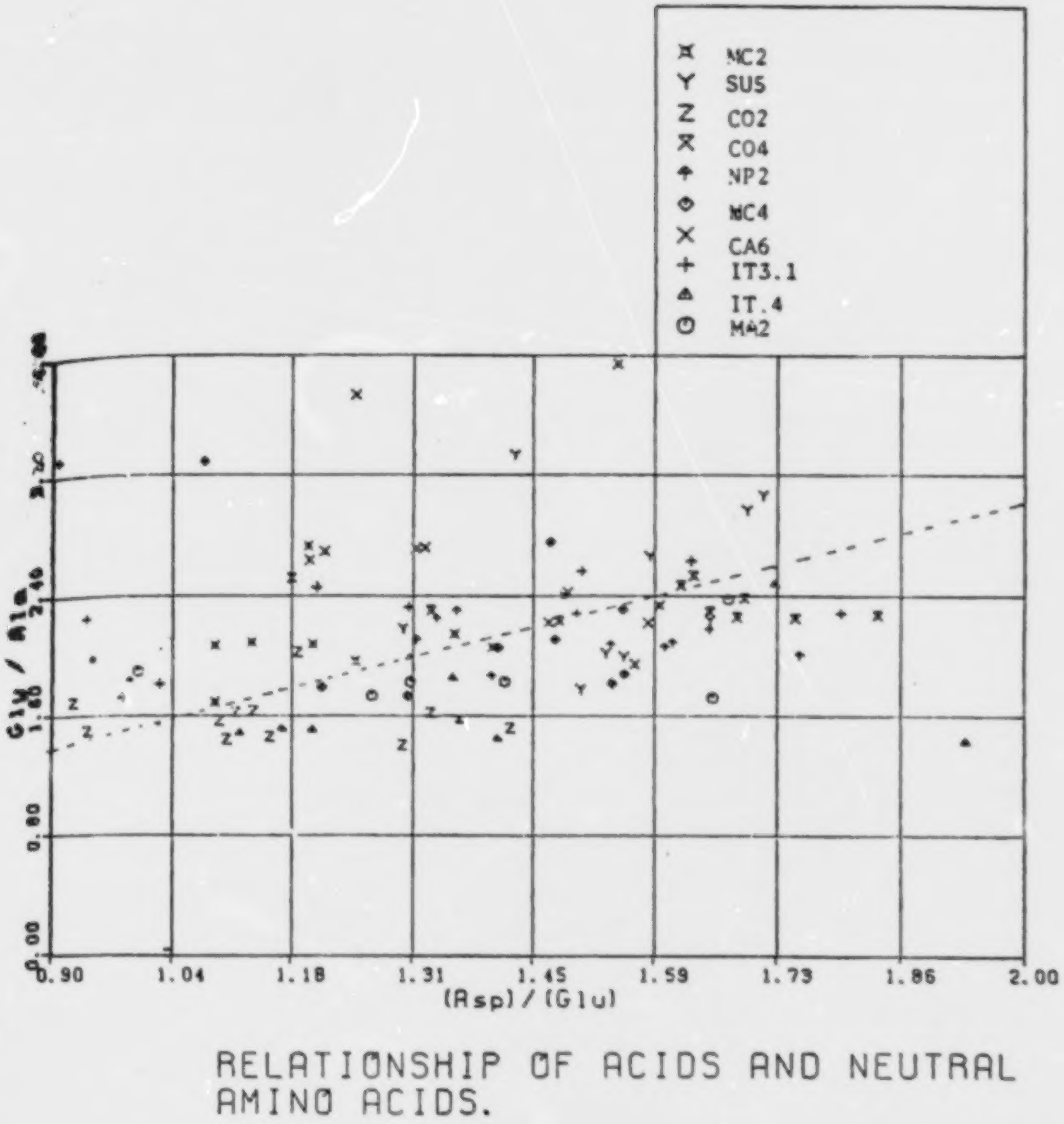

Figure 6. Distribution of Gly/Ala against Asp/Glu for all the cores

CHAPTER 14

AIRPHOTO INTERPRETATION OF CHANGES TO THE POSITION OF TIDEWATER GLACIERS AND DELTAS ALONG THE NE BAFFIN COAST

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B2Y 4A2

Objectives:

Examination of sequential airphotos of selected deltas and glaciers (Fig. 1) provides some proxy indication of the flux of water, ice and sediment into the fjords along the NE coast of Baffin Island. This work, in part, complements the glacier surveys of Falconer (1962).

Methods:

Trimetrigon NAPL flights provide the earliest (1948 to 1950) photos of some of the fjord coast of Baffin Island. A complete NAPL island coverage (vertical airphotos only) occurred next in 1958, and again in 1960. Later NAPL flights were spotty in coverage. Photos were taken with a variety of lens diameters and at elevations between 13,000' to 30,000'. Most of the air photographs are black & white; colour and infrared coverage images are occasionally available. The most recent data (1982 - 1985) came from ground and air surveys undertaken as part of project SAFE.

Airphotos were enlarged and brought to a common scale (1:5,000). Sequential airphotos of the same area were compared at this scale. Glacier movement and delta progradation were measured directly from fixed points on land.

Results:

CORONATION GLACIER (Fig. 2)

Ice velocity measurements were made using the changes in position of large boulders on the glacier surface. Advances were measured once at the middle of the glacier ($y_o = 0$) where the maximum flow velocity is expected (Table 1). Advances were measured for three periods from the northern medial moraine (i.e., $y_i / y_{T/2} = 0.5$ where y_i is any lateral position and y_T is the width of the glacier near the observation points). These values were computed to values at y_o from the one medial flow measurement (Table 1). The position of the Little Ice Age maximum (circa 1890) was determined from an easily recognized trim line. Ice front retreat rates were determined using the mean position of the ice front perpendicular to the valley axis (this allows direct comparison to the calculated ice advance rates at the medial ice position). The annual iceberg production rate was calculated using 50 % of the maximum annual advance (times the tidewater ice thickness---150 m---times the tidewater ice width---1,700 m) plus the annual retreat distance (times the tidewater ice thickness, times the tidewater ice width); ice-front melting is considered a minor process, except locally. The iceberg production since the Little Ice Age maximum was calculated through use of an averaged ice flow rate but with an ice front thickness of 200 m, i.e. deeper bathymetry.

Gilbert (1982) calculated an average surface flow rate and retreat rate, between 1958 and 1975, of 56 m a^{-1} and 15 m a^{-1} respectively, which compares favourably to our more detailed data set (Table 1).

COUTTS INLET GLACIER #12 (Fig. 3)

This is the only other glacier for which ice velocity measurements were possible from the available airphotos. The iceberg production rate assumed an icefront thickness of 100 m, a conservative estimate. The icefront is affected by the joining of two side-entry glaciers (A & B on Fig. 2). In 1948, the A glacier with apparently higher flow rates had cut-off glacier B near the tidewater line. In 1958, glacier B had advanced at flow rates roughly equivalent to that of glacier A (as indicated by the re-establishment of the medial moraine position parallel to the lateral margins of both glaciers). This icefront is one of the few that has advanced during the postwar period along the NE Baffin coast.

Other Glaciers:

Unfortunately ice flow rates for other glaciers could not be determined. Listed in Table 2 is the more easily measured retreat (or more rarely advance) rates for a wide selection of coastal Baffin glaciers (Fig. 1). The large difference in the 1948 - 1958 and the 1958 - 1985 retreat rates for the Erik Harbour glacier (i.e. some 36 m a^{-1}) relate to the widening of the tidewater ice front during progressive retreat.

Deltas:

Rates of delta progradation were determined for a few rivers draining the fjord hinterland of Baffin Island (Table 3). These rates can not be used directly for bed load calculations as the rate and size of delta front slides is not known.

Acknowledgements:

I thank Dan Praeg for drafting the figures.

References:

Falconer, G.

1962: Glaciers of northern Baffin and Bylot Islands, NWT. Geographical Paper 33, Dept. of Mines and Technical Surveys, Ottawa, 31 p with photos and map.

Gilbert, R.

1982: Contemporary sedimentary environments on Baffin Island, N.W.T., Canada: Glaciomarine processes in fiords of eastern Cumberland Peninsula. Arctic and Alpine Research, v. 14, p. 1-12.

Table 1: Coronation Glacier and Coutts Inlet Glacier #12

Period (years)	Advance Rate at $y_i / y_{T/2} = 0.5$ ($m\ a^{-1}$)	Advance Rate at y_o ($m\ a^{-1}$)	Retreat Rate ($m\ a^{-1}$)	Iceberg Production ($km^3\ a^{-1}$)
Coronation Glacier				
1948 - 1958	50 ± 5	138*	2.6 ± 0.3	0.018
1958 - 1960	45	124*	50.0	0.028
1960 - 1975	40	111	4.4	0.015
1890 - 1975		123**	11.8	0.025
Coutts Inlet Glacier # 12				
1948 - 1958		59	-12.5***	0.005

*estimated from the 1960 to 1975 rate data

**based on the average of the three data sets between 1948 to 1975

*** icefront advance

Table 2: Rates of retreat for a number of Baffin fiord glaciers

Glacier I.D. (Fig. 1)	System	Period (years)	Retreat Rates ($m\ a^{-1}$)	Figure	Present type
1	Sunneshine	1949 - 1960	8.5	4	tidewater
2	Sunneshine	1949 - 1960	5.7	4	tidewater
3	Coronation	1949 - 1975	4.0	2	tidewater
4	Maktak	1948 - 1960	14	1	terrestrial
5	Itirbilung	1948 - 1960	32	5	tidewater
		1960 - 1983	17	5	terrestrial
6	Itirbilung	1948 - 1960	5	5	tidewater
		1960 - 1983	12	5	terrestrial
7	McBeth	1948 - 1958	25	1	terrestrial
8	McBeth	1948 - 1958	10	1	terrestrial
9	McBeth	1948 - 1958	20	1	terrestrial
10	McBeth	1948 - 1958	15	1	terrestrial

Table 2 (cont.)

Glacier I.D. (Fig. 1)	System	Period (years)	Retreat Rates (m a^{-1})	Figure	Present type
11	McBeth	1948 - 1958	19	1	tidewater
12	McBeth	1948 - 1958	13	1	terrestrial
13	McBeth	1948 - 1958	20	1	terrestrial
14	McBeth	1948 - 1958	20	1	terrestrial
15	Clark	1948 - 1958	7	6	terrestrial
		1958 - 1960	3	6	terrestrial
16	Coutts Inlet	1948 - 1958	-12.5*	3	tidewater
17	North Arm	1948 - 1960	stable	7	tidewater
27	North Arm	1948 - 1960	5.2	8	tidewater
18	North Arm	1948 - 1960	-10.8*	9	tidewater
19	Erik Harbour	1948 - 1958	50	10	tidewater
		1958 - 1985	14.4	10	tidewater
20	Erik Lakes	1948 - 1985	10	11	tidewater
21	Oliver Sound	1960 - 1983	10	12	terrestrial

*advance

Table 3: Rates of delta progradation

Delta I.D. (Fig. 2)	System	Period (years)	Progradation Rates (m a^{-1})	Figure
22	Maktak	1960 - 1975	1.1	1
23	Tingin	1948 - 1960	6	1
24	Itirbilung	1948 - 1960	2.6	1
25	McBeth	1958 - 1960	4.5	1
		1960 - 1983	0.2	1
26	Keel River	1948 - 1960	0.4	13
		1960 - 1983	1.0	13

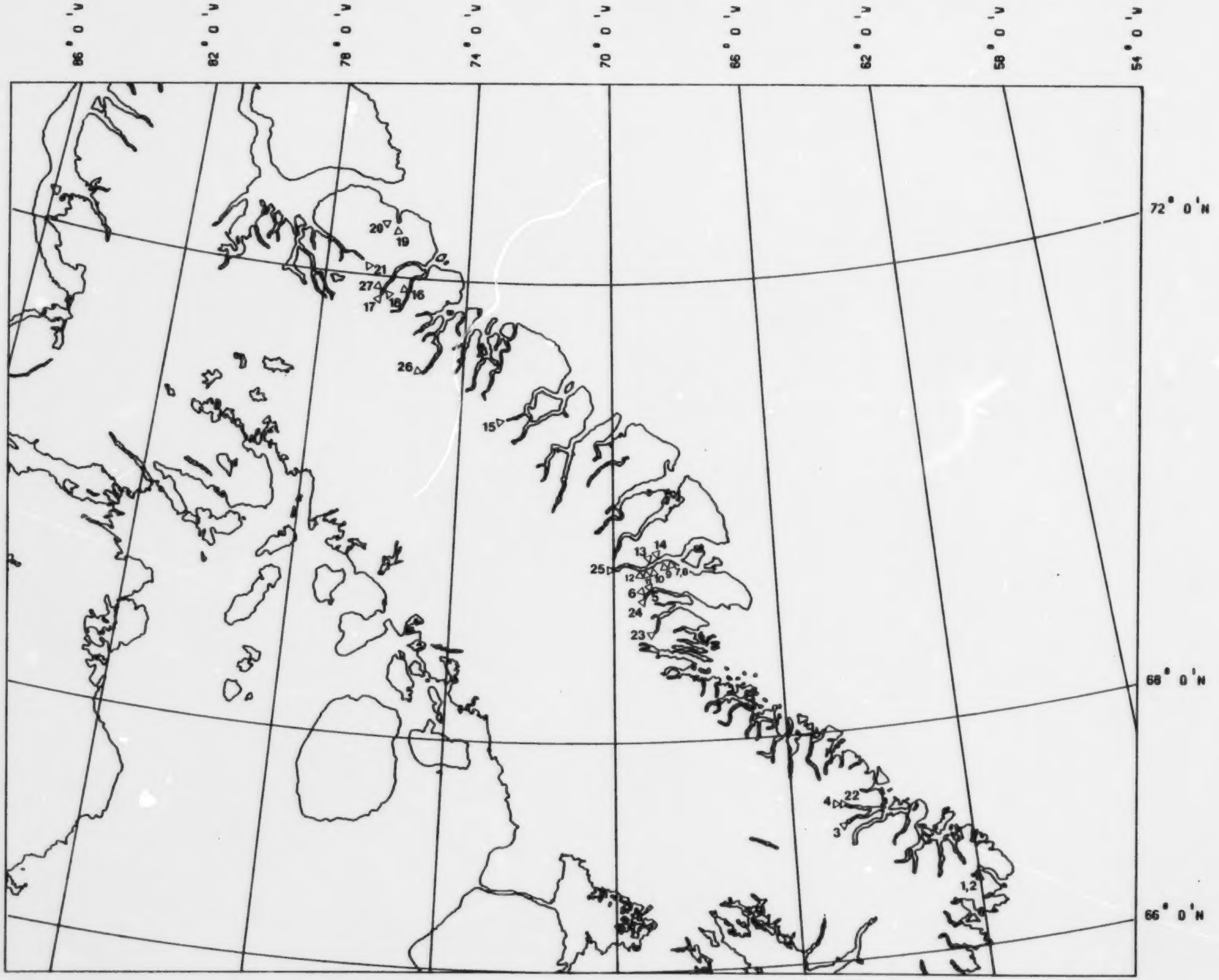
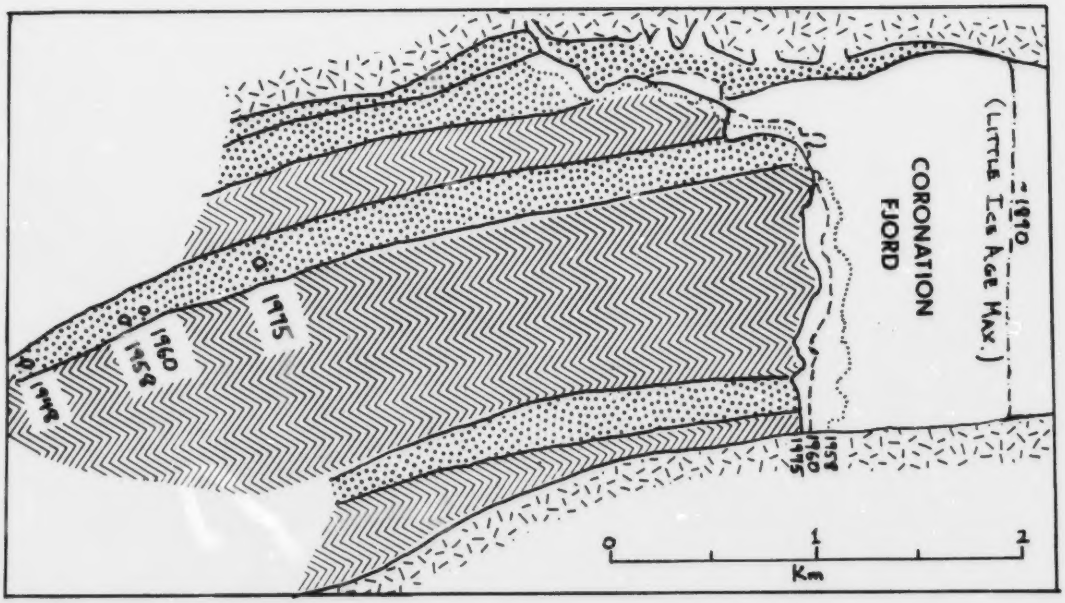

86° 0'W
82° 0'W
78° 0'W
74° 0'W
70° 0'W
66° 0'W
62° 0'W
58° 0'W
54° 0'W
72° 0'N
68° 0'N
66° 0'N
20
19
21
27
16
17
18
26
15
13
14
25
12
10
9
7,8
6
5
24
23
22
4
3
1,2

Figure 1 - Locations of selected glaciers and deltas along the northeast Baffin Island coast. Identifying numbers refer to Tables 2 and 3.

KEY TO FIGURES

▧	Glacial Ice
⠿	Morainal Sediment
▥	Fluvial - Deltaic Sediment
⁄	Bedrock



1948
1958
1960
1975
1975
1960
1958
CORONATION FJORD
≈1890 (LITTLE ICE AGE MAX.)
0
1
2
Km

Figure 2.

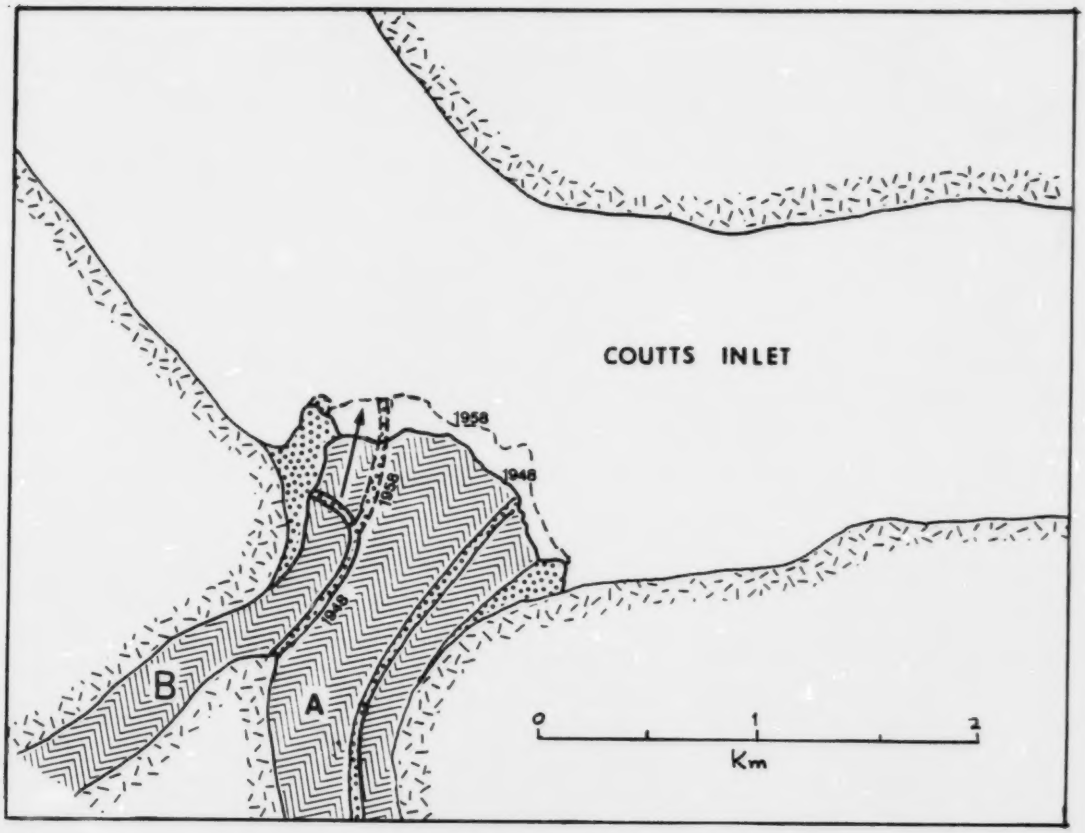

COUTTS INLET
1958
1948
1958
1948
B
A
0
1
2
Km

Figure 3.

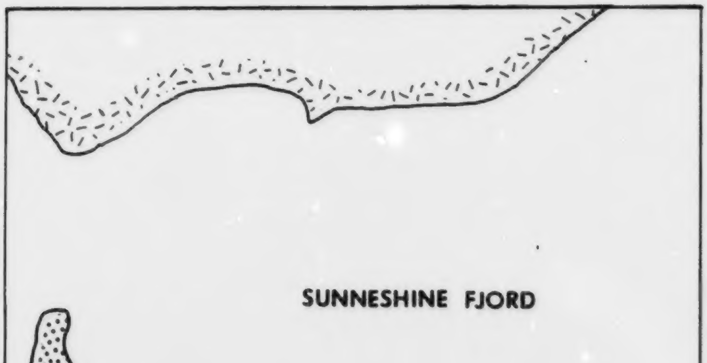

SUNNESHINE FJORD
1949
1960
2
1949
1960
1
0
1
2
Km

Figure 4.

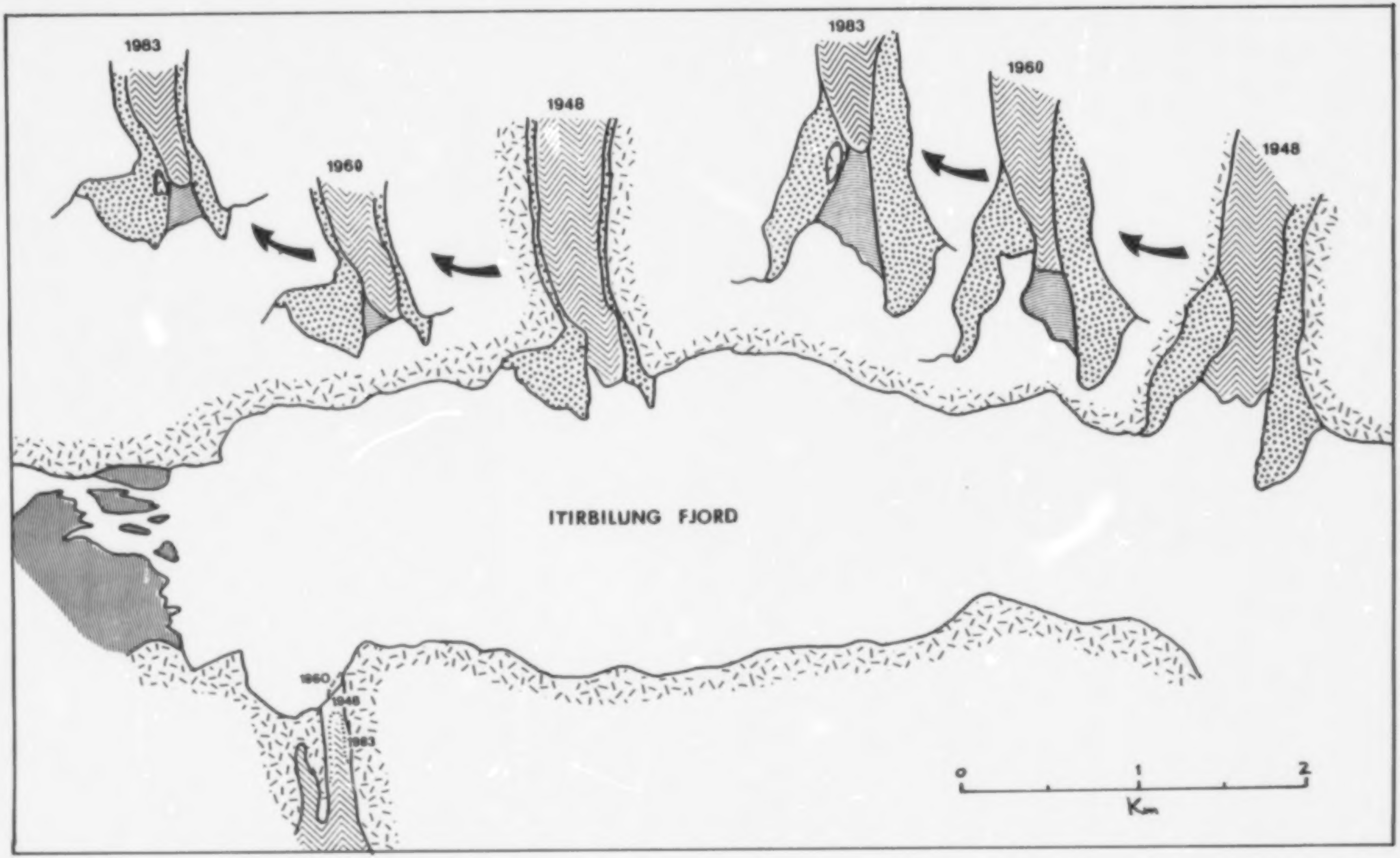

1983
1960
1948
1983
1960
1948
ITIRBILUNG FJORD
1960
1948
1983
0
1
2
Km

Figure 5.

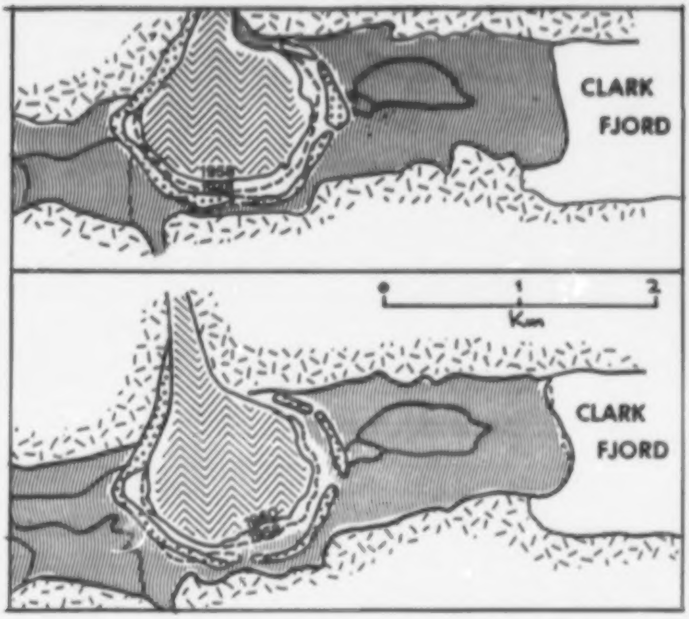

CLARK
FJORD
0
1
2
Km
CLARK
FJORD

Figure 6.

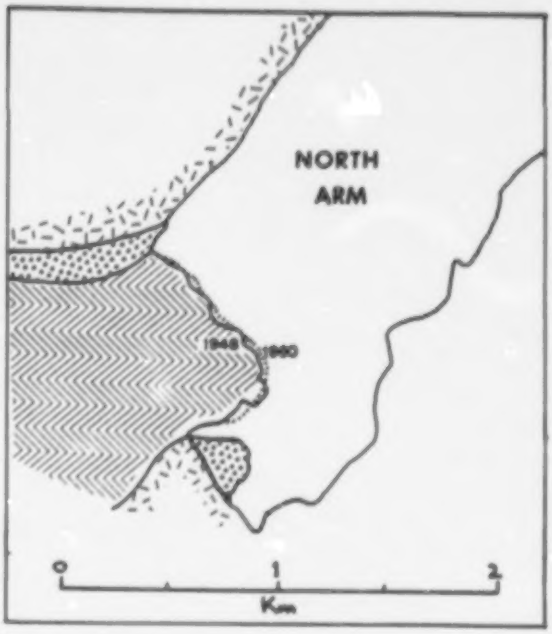

NORTH
ARM
1948
1960
0
1
2
Km

Figure 7.

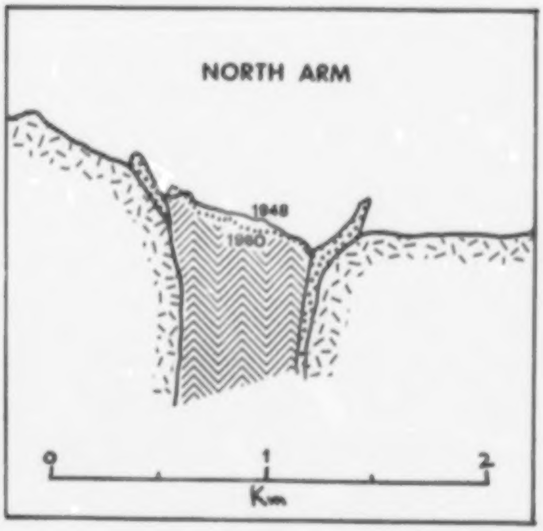

NORTH ARM
1948
1960
0
1
2
Km

Figure 8.

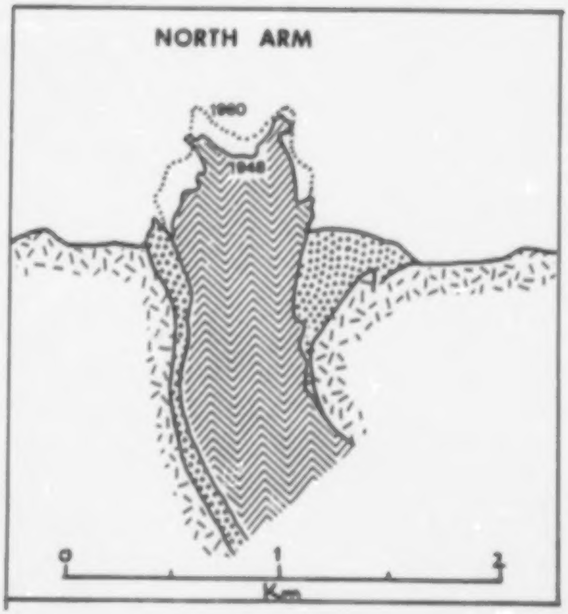

NORTH ARM
1960
1948
0
1
2
Km

Figure 9.

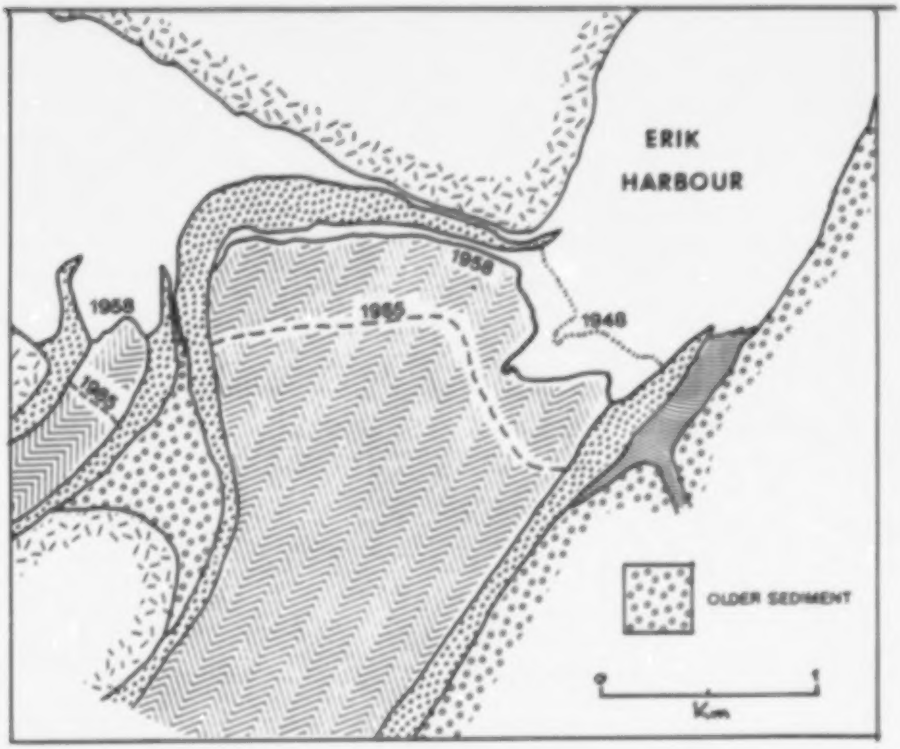

ERIK
HARBOUR
1958
1965
1948
1958
1965
OLDER SEDIMENT
0
1
Km

Figure 10.

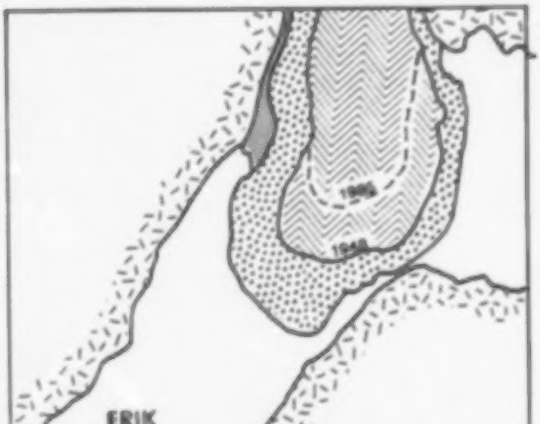

1965
1958
ERIK
LAKES
0
1
Km

Figure 11.

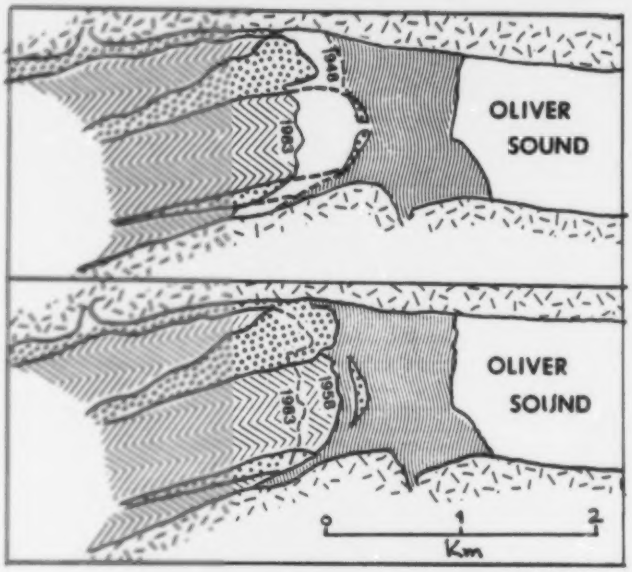

1948
OLIVER
SOUND
1963
OLIVER
SOUND
1963
1956
0
1
2
Km

Figure 12.

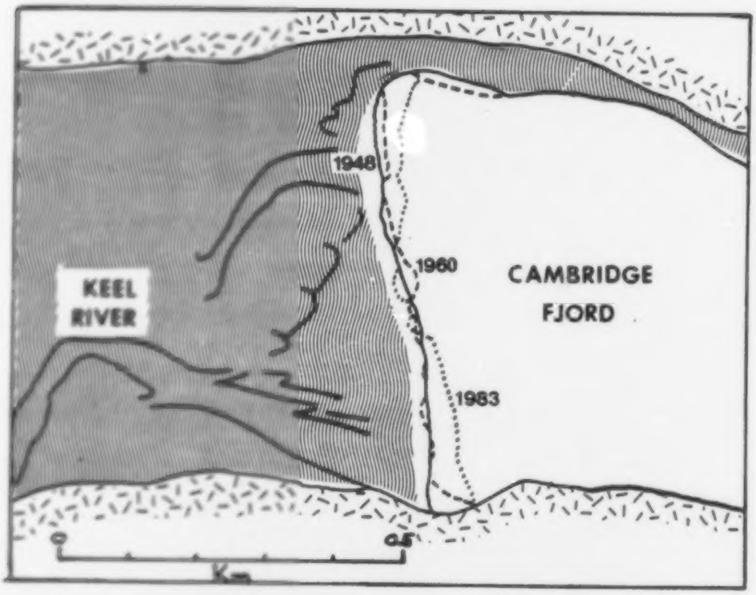

1948
1960
CAMBRIDGE
FJORD
KEEL
RIVER
1963
0
0.5
Km

Figure 13.

CHAPTER 15

AMENDMENTS TO GRAIN SIZE DATA FROM S.A.F.E. DATA REPORTS VOLUMES 1 AND 2

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VOLUME 1

At the time of publication of Volume 1, neither grain size frequency distribution plots nor silt and clay percentages were available for the 1982 delta samples of Chapter 18 (Syvitski et al., 1983). These are presented here as Figure 1 and Table 1. In addition, the moment statistics presented for these samples in Chapter 18 were calculated without including the gravel fraction. Revised moment statistics for the whole samples are included in Table 1.

VOLUME 2

All grain size analyses presented in Volume 2 were processed through the program READY (Hackett et al., 1986) to obtain size fraction percentages, moment statistics, and frequency distribution plots. Subsequent to publication, small errors were recognized in the tabulated major size fraction percentages of some samples. Two forms of error were recognized: (1) silt and clay percentages were indicated for some samples with less than 10% mud, for which no detailed mud analyses had been performed, and (2) gravel percentages were often slightly high, by up to 6% but generally less than 1%, at the expense of sand. These errors did not affect the tabulated moment statistics, or the frequency distribution plots. These errors were traced to problems with the format of the grain size submittal files. The program was calculating end-points for size intervals, some of which were not separated by consistent amounts. This problem was resolved by having the program use the mid-points of each of the size intervals.

Revised versions of the tabulated grain size data from Chapters 17-19 (Syvitski et al., 1984a, 1984b, and Asprey, 1984 respectively) are presented below as Tables 2 to 4. Samples affected by the revisions are indicated by an asterix (*). Tabulated grain size data from other chapters of Volume 2 were not affected by the format problems.

REFERENCES

Asprey, K.W.

1984: SAFE 1983: heavy mineral distribution. In Syvitski, J.P.M. (compiler), Sedimentology of Arctic Fjords Experiment: HU83-028 Data Report, Volume 2. Canadian Data Report of Hydrography and Ocean Sciences # 28, Chapter 19, 36 p.

Hackett, D.W., Syvitski, J.P.M., Prime, W. and Sherin, A.G.

1986: Sediment size analysis system user guide. Geological Survey of Canada, Open File Report #1240, 25 p.

Syvitski, J.P.M., Asprey, K.W., Blakeney, C.P. and Clattenburg, D.

1983: SAFE: 1982 delta report. In Syvitski, J.P.M. and Blakeney, C.P. (compilers), Sedimentology of Arctic Fjords Experiment: HU82-031 Data Report, Volume 1. Canadian Data Report of Hydrography and Ocean Sciences # 12, Chapter 18, 41 p.

Syvitski, J.P.M., Farrow, G.E., Taylor, R., Gilbert, R., and Emory-Moore, M.

1984b: SAFE: 1983 delta survey report. In Syvitski, J.P.M. (compiler), Sedimentology of ArcticFjords Experiment: HU83-028 Data Report, Volume 2. Canadian Data Report of Hydrography and Ocean Sciences # 28, Chapter 18, 91 p.

Syvitski, J.P.M., Hay, A.E., Schafer, C.T. and Asprey, K.W.

1984a: SAFE: 1983 bayhead prodelta investigations. In Syvitski, J.P.M. (compiler), Sedimentology of ArcticFjords Experiment: HU83-028 Data Report, Volume 2. Canadian Data Report of Hydrography and Ocean Sciences # 28, Chapter 17, 62 p.

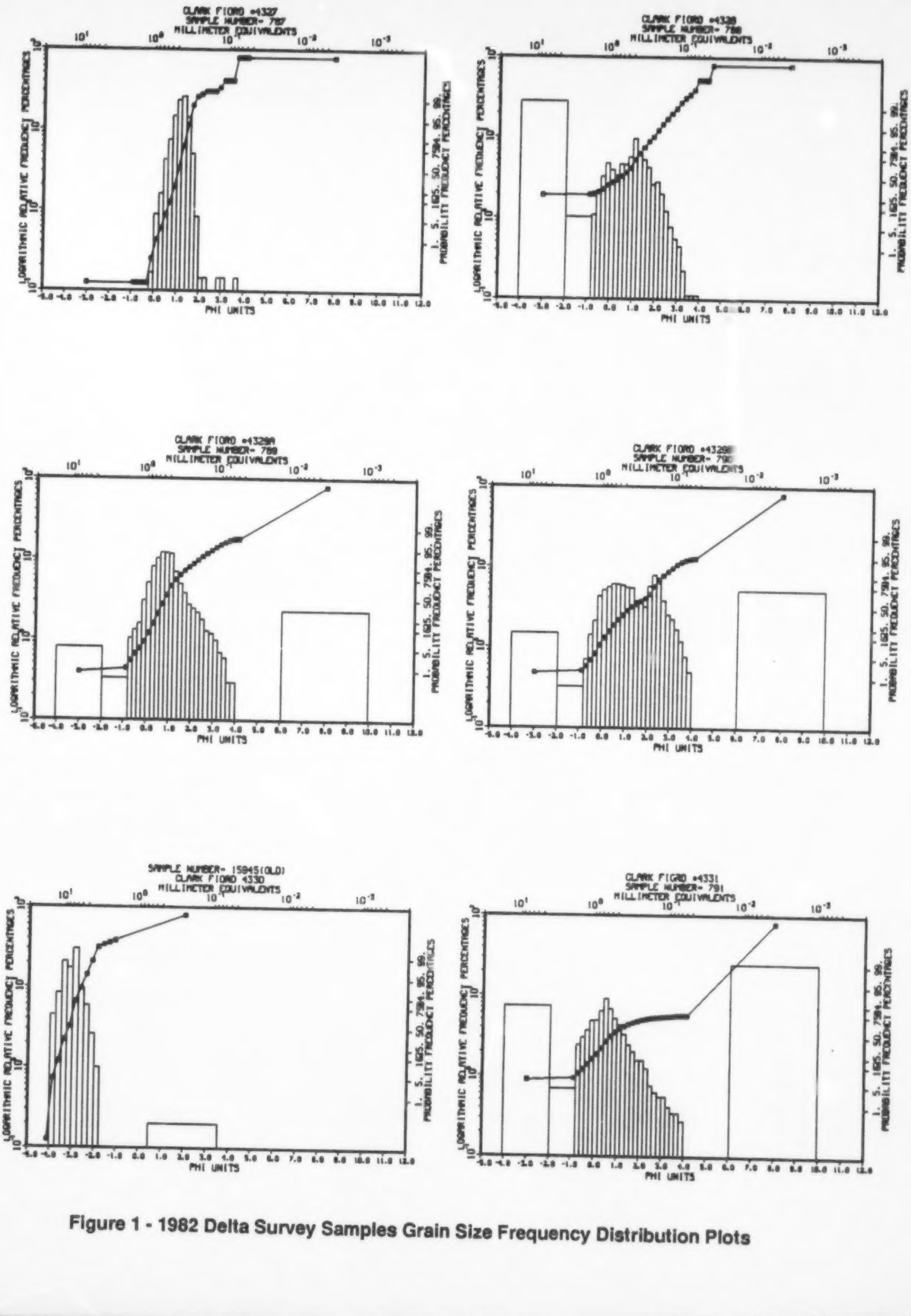

Figure 1 - 1982 Delta Survey Samples Grain Size Frequency Distribution Plots

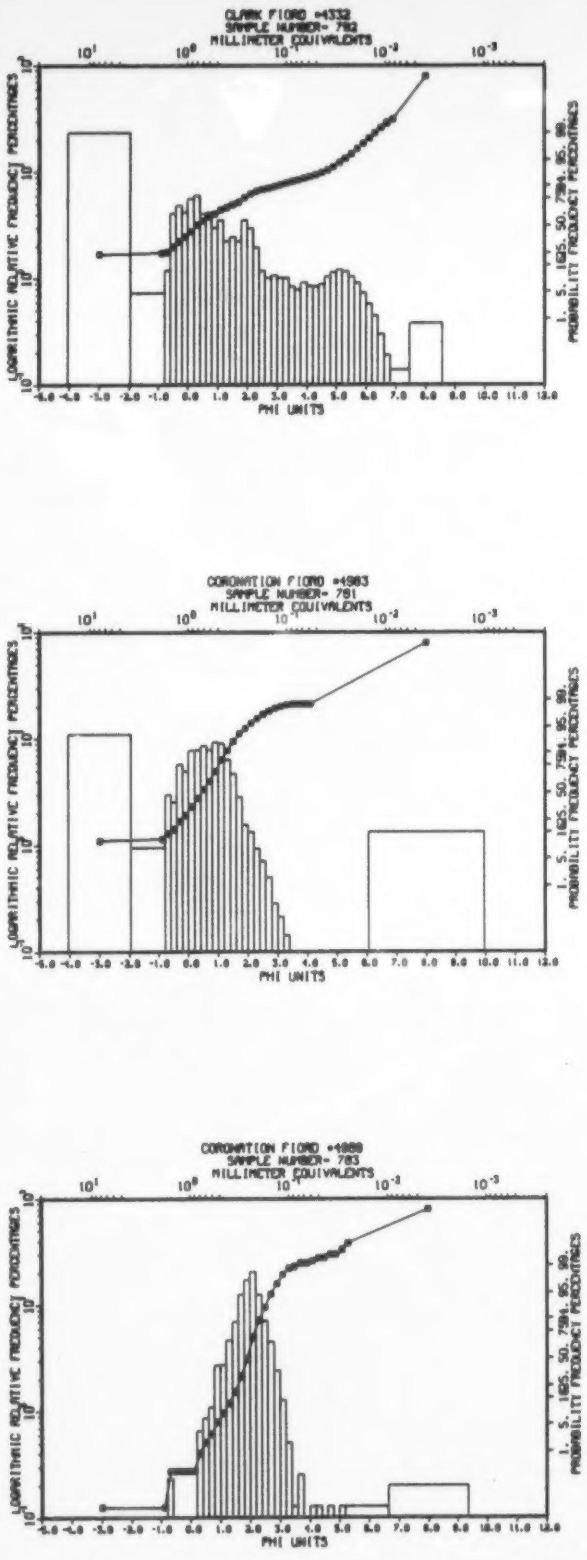

Figure 1 (continued)

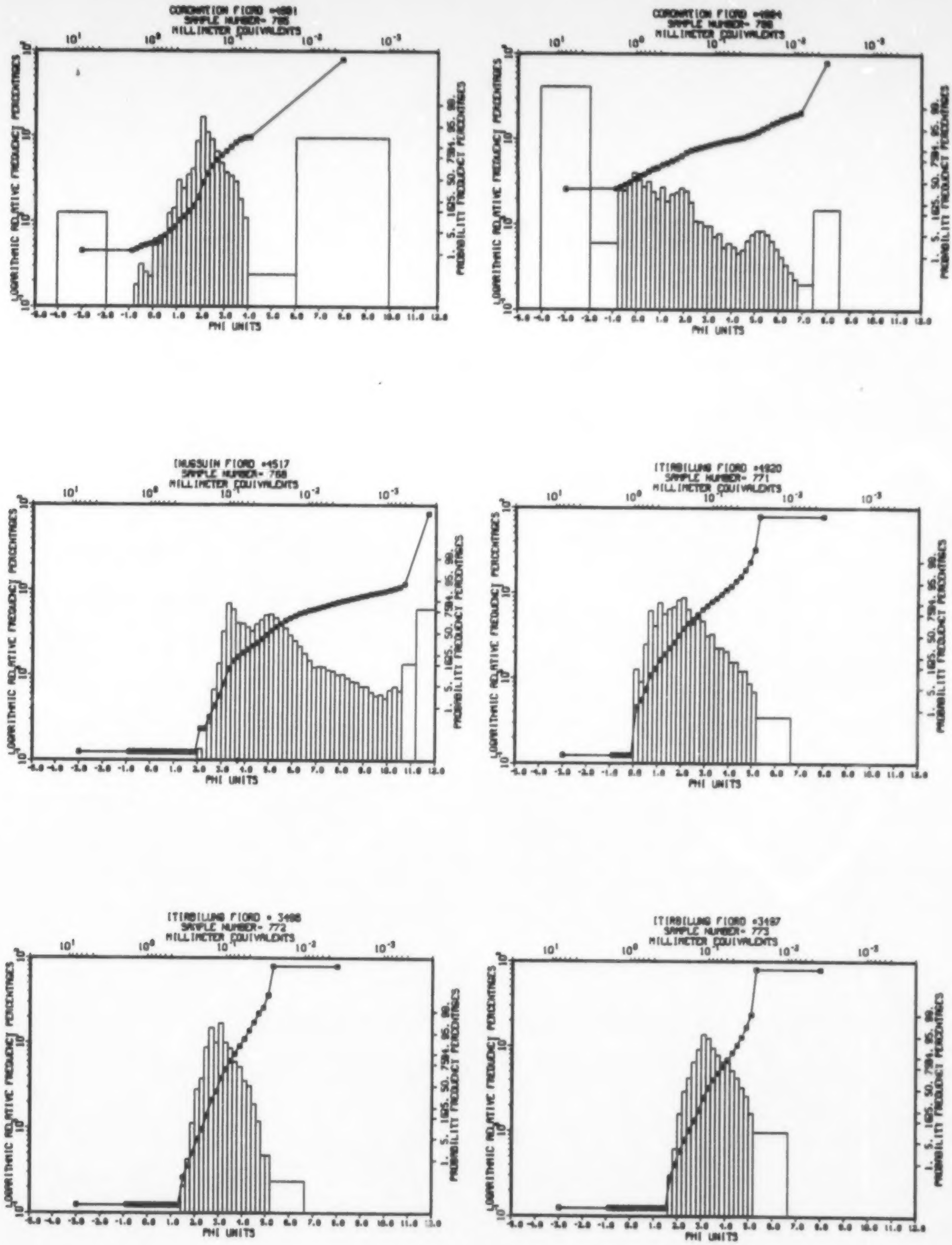

Figure 1 (continued)

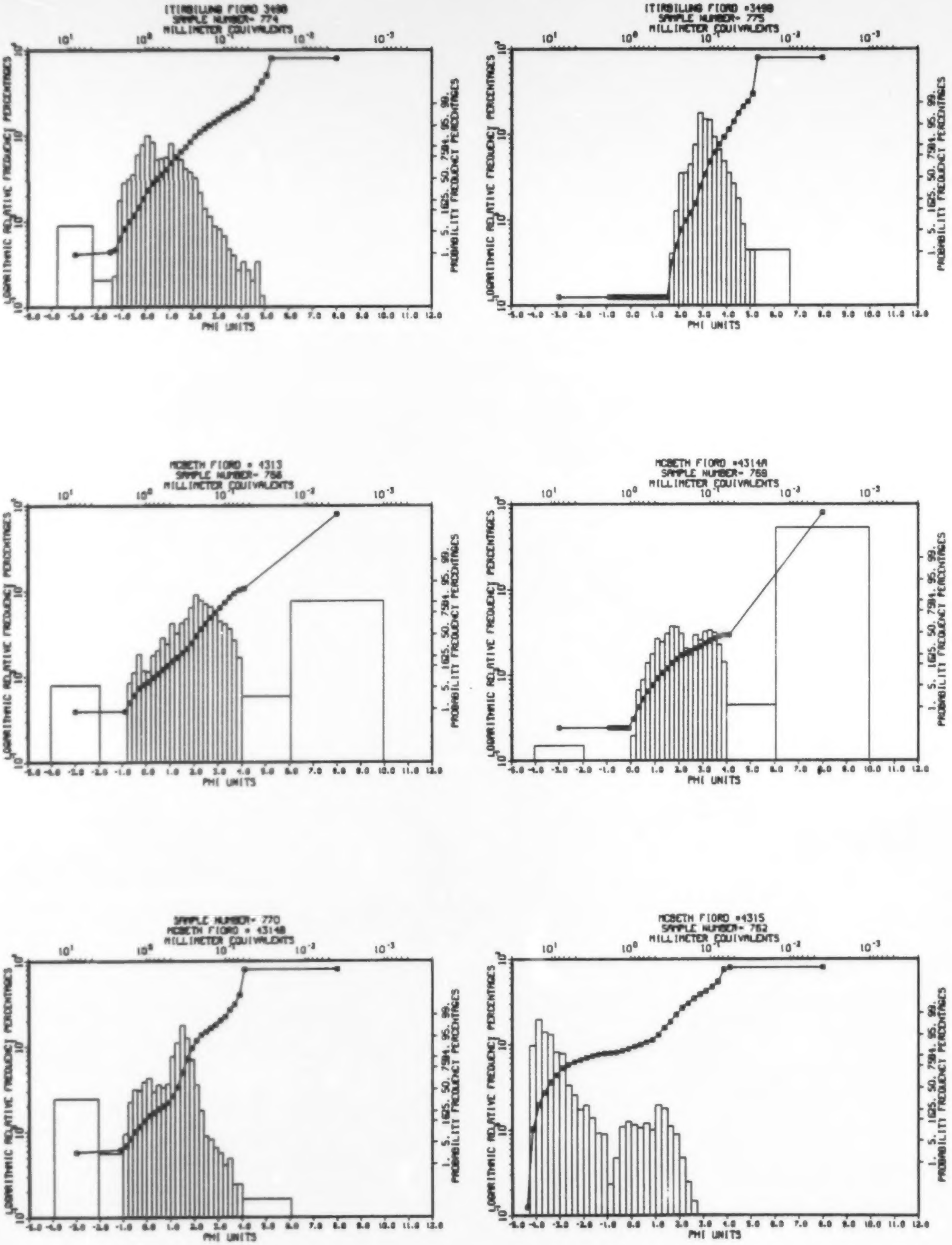

Figure 1 (continued)

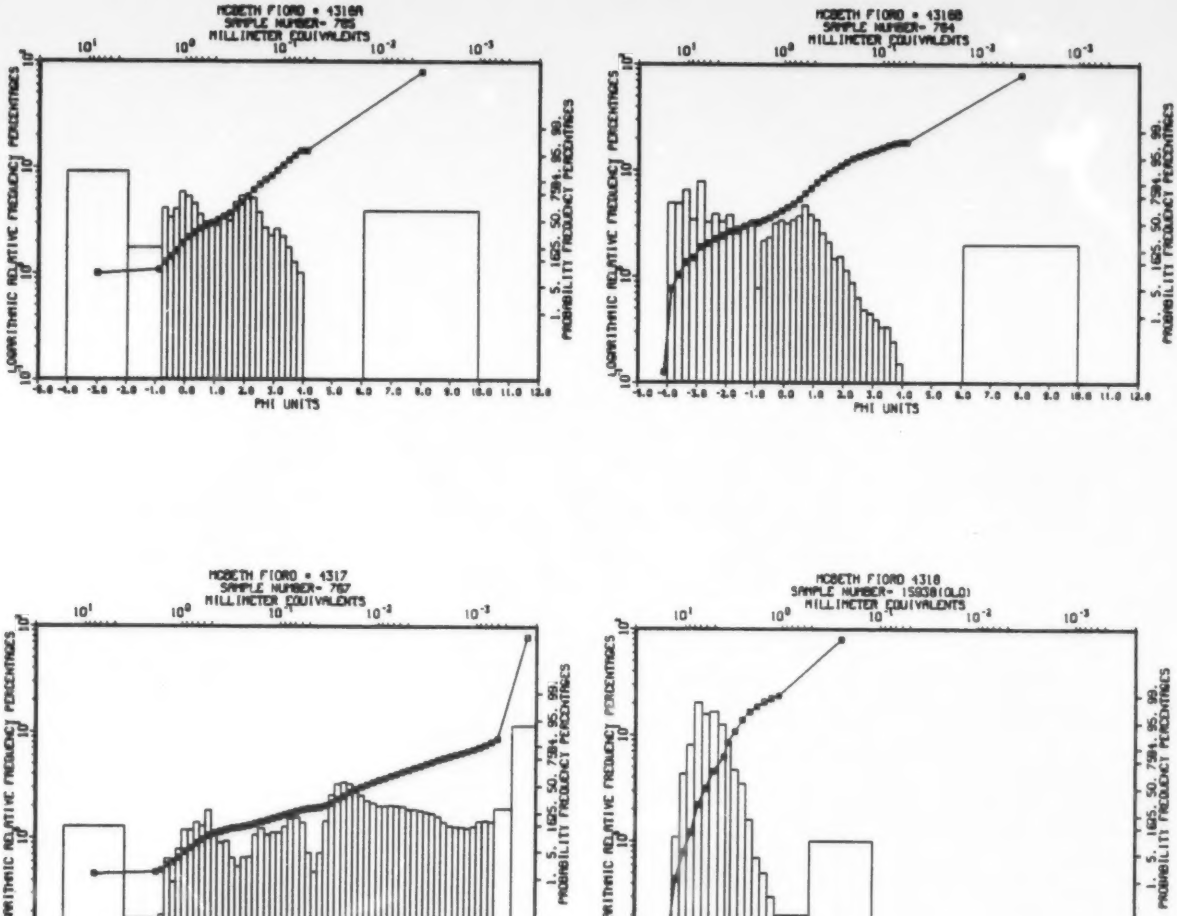

Figure 1 (continued)

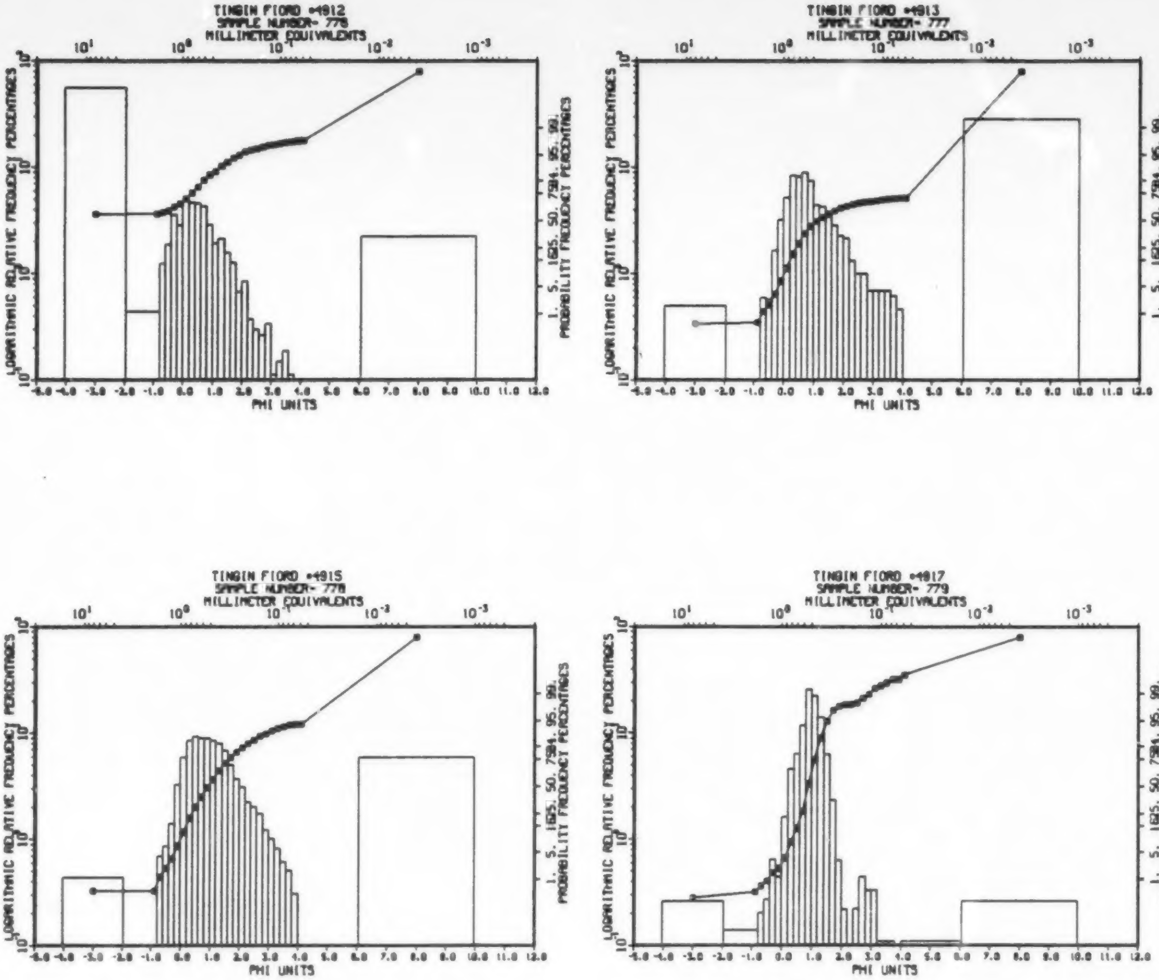

Figure 1 (continued)

TABLE 1

1982 DELTA SAMPLES G.S. (UPDATED FROM TABLE 18.2 OF VOLUME 1)

SAMPLE ID (820-#)	LAB #	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	SD Ø	SK	KU
CLARK										
4327	787	0.00	100.00	0.00	---	---	1.15	0.37	0.43	8.07
4328	788	28.01	71.93	0.06	---	---	-0.16	1.93	-0.49	1.84
4329A	789	0.80	96.90	2.30	---	---	1.13	1.38	2.69	15.19
4329B	790	1.50	93.23	5.27	---	---	1.68	1.89	1.61	7.35
4330	15945	99.80	0.20	0.00	0.00	0.00	-3.03	0.48	2.51	26.94
4331	791	7.40	67.90	24.70	---	---	2.24	3.52	0.74	2.21
4332	792	23.50	64.62	11.88	---	---	0.53	2.59	0.32	2.59
CORONATION										
4977	780	37.10	42.19	20.71	16.86	3.85	0.71	3.63	0.65	2.42
4983	781	11.08	87.58	1.34	---	---	0.36	1.62	0.57	8.88
4988	782	16.92	82.92	0.16	---	---	0.01	1.52	-0.83	4.09
4989	783	0.00	99.17	0.83	---	---	1.98	0.64	1.78	20.61
4990	784	0.00	82.63	17.37	---	---	3.28	1.52	2.01	6.90
4991	785	1.27	88.92	9.81	---	---	2.71	1.96	1.43	6.19
4994	786	41.04	49.39	9.57	---	---	-0.19	2.85	0.73	2.80
INUGSUIN										
4517	768	0.00	26.81	73.19	56.17	17.02	5.74	2.40	1.13	3.43
ITIRBILUNG										
4920	771	0.00	92.50	7.50	---	---	2.14	1.11	0.59	2.86
3496	772	0.00	89.03	10.97	---	---	3.16	0.64	0.53	3.25
3497	773	0.00	75.47	24.53	---	---	3.48	0.73	0.33	2.65
3498	774	3.11	95.48	1.41	---	---	0.75	1.16	0.48	4.28
3499	775	0.00	89.72	10.28	---	---	3.20	0.61	0.46	3.65
MCBETH										
4313	766	0.80	90.91	8.29	---	---	2.47	1.95	1.33	5.89
4314A	769	0.15	46.36	53.49	---	---	5.30	2.95	-0.29	1.33
4314B	770	3.01	96.83	0.16	---	---	1.05	1.09	-1.22	6.06
4315	762	85.60	14.39	0.01	---	---	-2.75	1.63	1.69	4.83
4316B	764	50.80	47.17	2.03	---	---	-0.85	2.30	1.10	5.35
4316A	765	9.20	86.83	3.97	---	---	1.12	2.20	0.65	5.03
4317	767	1.30	24.65	74.05	41.20	32.84	6.28	3.54	-0.28	2.43
4318	15938	97.30	2.70	0.00	0.00	0.00	-2.38	0.73	2.34	14.11
4319	761	0.00	99.88	0.12	---	---	1.71	0.58	1.38	5.13
4320	763	0.00	99.63	0.37	---	---	1.23	0.85	1.26	4.23
TINGIN										
4912	776	56.05	41.66	2.29	---	---	-1.26	2.31	1.57	6.44
4913	777	0.50	70.92	28.58	---	---	2.96	3.28	0.76	1.82
4915	778	0.44	93.62	5.94	---	---	1.48	1.86	2.42	9.26
4917	779	0.26	99.37	0.37	---	---	1.00	0.63	3.39	48.23

TABLE 2

1983 PRODELTA GRABS G.S. (REVISED FROM TABLE 17.1 OF VOLUME 2

SAMPLE	LAB ID	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KURT
BWD										
CA-1	2063	1.40	66.15	32.45	28.75	3.70	3.26	2.32	0.44	3.51
CA-2	2064	0.20	93.48	6.32	5.65	0.67	2.68	1.16	1.39	14.17
CA-3	*2065	6.00	92.90	1.10	---	---	1.12	1.46	-0.08	9.36
CA-4	2066	1.60	93.18	5.22	4.53	0.69	1.80	1.51	0.93	8.61
CA-5	2067	2.10	88.21	9.69	7.66	2.03	1.97	1.96	1.33	7.47
CA-6	2068	3.80	86.15	10.05	7.71	2.34	2.40	2.07	0.63	7.1
CA-7	2069	0.20	93.36	6.44	5.88	0.56	1.71	1.40	1.79	8.42
CA-9	2070	0.30	77.66	22.04	19.40	2.64	3.34	1.70	1.30	6.9
CA-10	2071	1.30	90.50	8.20	7.20	1.00	2.07	1.60	1.05	7.61
CA-11	2072	0.50	91.04	8.46	7.39	1.07	2.43	1.45	1.60	10.84
SHOVELLER										
CA-1	*2082	16.50	49.24	34.26	27.70	6.56	2.53	3.55	0.16	2.5
CA-2	2083	33.00	34.22	32.78	22.75	10.03	1.88	4.28	0.31	2.11
CA-3	2084	27.80	23.23	48.96	33.05	15.91	3.00	4.80	-0.06	1.8
CA-4	*2085	25.80	41.53	32.67	24.74	7.93	1.97	3.94	0.31	2.17
CA-5	2086	7.90	53.17	38.93	30.25	8.67	3.80	3.07	0.01	3.85
CA-6	2087	63.88	21.43	14.69	8.67	6.02	-0.49	3.90	1.42	3.89
CA-7	2088	2.80	63.62	33.58	22.66	10.92	3.62	3.05	0.76	3.4
CA-8	2089	89.11	6.74	4.15	2.64	1.51	-2.66	2.58	2.98	12.11
CA-9	*2090	76.00	23.48	0.52	---	---	-2.11	1.67	2.00	8.48
CA-10	2091	31.60	49.11	19.29	12.89	6.40	0.95	4.05	0.34	2.49
CA-11	2092	0.10	47.03	52.87	40.07	12.80	4.73	2.58	0.46	2.3
CA-12	2093	0.00	18.41	81.59	64.26	17.33	6.00	2.08	-0.08	2.7
CA-13	*2094	49.50	30.46	20.04	11.11	8.93	0.53	4.17	1.05	3.12
GREBE										
CA-1	2095	0.50	82.25	17.25	15.16	2.09	2.69	1.86	1.15	5.63
CA-2	2096	0.00	64.24	35.76	31.12	4.64	3.57	2.22	0.84	3.03
CA-3	2097	0.10	90.57	9.33	8.28	1.05	2.60	1.31	2.12	11.07
CA-4	2098	0.30	75.97	23.73	21.52	2.21	3.29	1.65	1.08	5.59
CA-5	2099	0.00	43.72	56.28	51.07	5.21	4.63	1.79	0.52	2.98
CA-6A	2100	0.00	46.68	53.32	49.25	4.07	4.31	2.02	0.19	2.34
CA-6B	2101	0.00	46.67	53.33	45.99	7.34	4.55	2.07	0.54	2.74
CA-7	2102	0.00	55.39	44.61	40.04	4.57	4.00	2.09	0.52	2.53
CA-8	2103	0.10	62.91	36.99	32.42	4.57	3.75	2.16	0.68	2.98
CA-9	2104	0.10	48.80	51.10	42.67	8.43	4.68	2.00	0.81	3.23
CA-10	2105	0.10	41.67	58.23	48.51	9.72	4.93	1.99	0.66	3.05
CA-11	2106	0.10	38.28	61.62	54.22	7.40	4.87	1.86	0.50	3.43
MC-1	2107	0.00	3.20	96.80	53.58	43.22	7.74	2.15	-0.12	3
MC-2	2108	0.00	2.69	97.31	48.92	48.39	8.01	2.27	-0.10	2.62
MC-3	2109	0.10	4.18	95.72	54.71	41.01	7.58	2.32	-0.16	3.23
MC-4	2110	0.00	2.83	97.17	55.69	41.48	7.67	2.18	0.07	2.76
MC-5	2111	0.00	6.62	93.38	60.54	32.84	7.13	2.22	0.24	2.61
MC-6	2112	0.00	16.66	83.34	56.36	26.98	6.56	2.40	0.53	2.4
MC-7	2113	0.00	9.96	90.04	58.79	31.25	6.91	2.34	0.27	2.49
MC-8	2114	0.10	53.32	46.58	26.61	19.97	4.97	3.01	0.71	2.3
MC-9	2115	0.10	15.69	84.21	50.85	33.36	6.86	2.69	-0.03	2.48
MC-10	2116	0.00	5.11	94.89	59.73	35.16	7.29	2.17	0.18	2.54
MC-11	*2117	0.30	68.37	31.33	21.14	10.19	3.54	2.91	1.13	3.72
	*2118	2.30	95.59	2.11	---	---	1.16	1.29	1.85	16.4
MC-12	2119	0.00	42.02	57.98	41.25	16.73	5.32	2.58	1.14	3.31

TABLE 2 (continued)

1983 PRODELTA GRABS G.S. (REVISED FROM TABLE 17.1 OF VOLUME 2

SAMPLE	LAB ID	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KURT
MC-13	2120	0.00	32.75	67.25	46.35	20.90	5.83	2.59	0.82	2.63
MC-14	2121	0.00	27.67	72.33	48.12	24.22	6.14	2.64	0.57	2.34
MC-15	2122	0.00	5.41	94.59	60.76	33.83	7.17	2.28	0.26	2.56
MC-16	2123	0.00	4.78	95.22	60.96	34.26	7.29	2.23	0.32	2.52
MC-17	2124	0.00	7.09	92.91	43.97	48.94	7.87	2.43	-0.43	3.04
MC-18	2125	0.10	2.92	96.98	46.89	50.09	8.03	2.16	-0.44	3.88
MC-19	2126	0.00	2.48	97.52	49.54	47.98	8.00	2.13	-0.18	3.14
MC-20	*2127	0.00	3.42	96.58	48.91	47.67	7.98	2.21	-0.28	3.34
MC-21	2128	0.00	80.99	19.01	15.41	3.60	3.34	1.75	2.43	9.92
MC-22	2129	0.00	35.47	64.53	55.62	8.91	5.05	1.88	1.48	5.04
MC-23	2130	0.00	8.95	91.05	64.45	26.60	6.74	2.25	0.43	2.75
IT-1	2074	0.00	70.87	29.13	24.42	4.71	4.02	1.70	2.38	9.14
IT-1B	2075	0.00	54.40	45.60	35.93	9.67	4.68	2.13	1.48	4.75
IT-2	2076	0.30	44.64	55.06	43.05	12.01	4.86	2.55	0.78	3.53
IT-2B	2077	0.40	90.83	8.77	7.11	1.66	3.05	1.34	2.39	17.42
IT-3	2078	0.00	52.18	47.82	39.64	8.19	4.60	2.07	1.47	5.02
IT-4	2079	0.00	45.94	54.06	41.70	12.36	5.01	2.30	1.23	3.89
IT-5	2080	0.00	40.63	59.37	42.49	16.88	5.45	2.47	1.02	3.11
IT-6	2081	0.00	69.85	30.15	24.40	5.75	3.88	2.00	1.86	6.82

TABLE 3

1983 DELTA SURVEY G.S. (REVISED FROM TABLE 18.4 IN VOLUME 2)

SAMPLE	LAB ID	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KURT
OLIVER SOUND - 1	1356	0.03	92.93	7.03	6.95	0.08	2.40	1.03	1.31	6.57
OLIVER SOUND - 2	*1357	35.50	62.80	1.70	---	---	-0.28	2.43	0.13	3.67
OLIVER SOUND - 3	1358	0.09	29.20	70.71	66.12	4.58	4.90	1.51	1.43	7.26
OLIVER SOUND - 4	1359	0.00	19.70	80.30	76.51	3.78	5.36	1.62	-0.46	3.06
GUYS BIGHT	*1360	2.00	97.80	0.20	---	---	1.13	0.90	-0.89	16.72
GUYS BIGHT	1361	0.30	99.70	0.00	---	---	1.54	0.43	-3.02	43.04
GUYS BIGHT	*1362	0.00	99.70	0.30	---	---	1.47	0.43	1.89	14.36
EGLINTON SOUND	1363	0.10	99.90	0.00	---	---	1.29	0.53	-0.83	7.13
SCOTT ISLAND	1364	0.00	100.00	0.00	---	---	1.73	0.37	-0.16	6.01
S. BARRIER - 1	1365	0.00	100.00	0.00	---	---	1.96	0.25	-0.34	4.76
S. BARRIER - 2	1366	0.00	100.00	0.00	---	---	2.04	0.23	-0.90	4.63
S. BARRIER - 5	1367	0.00	100.00	0.00	---	---	1.83	0.30	-0.20	4.12
S. BARRIER - 6	1368	0.00	100.00	0.00	---	---	1.80	0.30	1.38	11.32
S. BARRIER	1369	0.90	99.10	0.00	---	---	1.99	0.54	-7.24	68.35
MID. BARRIER	1370	0.00	100.00	0.00	---	---	1.76	0.36	-0.13	4.53
MID. BARRIER	1371	0.00	100.00	0.00	---	---	1.93	0.29	0.31	8.48
MID. BARRIER	*1372	0.00	99.72	0.28	---	---	1.84	0.36	0.82	9.03
MID. BARRIER	*1373	0.00	99.20	0.80	---	---	1.82	0.67	6.12	58.64
MID. BARRIER	1374	0.00	100.00	0.00	---	---	1.42	0.42	-0.13	3.20
MID. BARRIER	1375	0.00	5.40	94.60	87.20	7.40	5.78	1.52	1.29	6.08
CAPE ADAIR	1376	0.40	99.60	0.00	---	---	0.18	0.41	0.49	32.93
CAPE HEWITT - 1	1377	1.80	86.85	11.35	7.34	4.01	2.82	2.21	1.97	10.50
CAPE HEWITT - 2	*1378	0.90	98.10	1.00	---	---	1.24	0.98	2.41	26.37
CAPE HEWITT - 2	1379	0.00	100.00	0.00	---	---	1.75	0.26	0.05	6.21
CAPE HEWITT - 2	1380	0.00	100.00	0.00	---	---	1.79	0.30	1.27	10.70
CAPE HEWITT - 2	1381	0.00	100.00	0.00	---	---	1.92	0.30	2.29	15.56
CAPE HEWITT - 2	*1382	12.70	86.70	0.60	---	---	0.13	1.22	0.41	13.97
CAPE HEWITT - 2	*1383	0.10	98.90	1.00	---	---	1.83	0.77	5.04	44.61
CAPE HEWITT - 2	1384	0.00	100.00	0.00	---	---	1.83	0.34	1.79	12.38
CAPE HEWITT - 3	*1385	0.00	99.97	0.03	---	---	1.88	0.31	2.21	52.56
CAPE HEWITT - 3	*1386	0.00	99.80	0.20	---	---	1.51	0.53	3.92	47.21
CAPE HEWITT - 4	*1387	0.00	99.50	0.50	---	---	1.81	0.61	5.16	53.39
MCBETH - 1	*1388	0.03	93.71	6.26	---	---	2.33	1.67	2.29	8.47
CLYDE	1389	1.60	98.40	0.00	---	---	1.01	0.72	-2.72	17.25
FECHAN BAY	1390	0.00	100.00	0.00	---	---	1.45	0.36	-0.51	5.27
CAMBRIDGE	1391	1.60	98.40	0.00	---	---	1.57	0.79	-2.91	19.09
CAMBRIDGE	1392	0.00	45.37	54.63	49.29	5.34	4.56	1.80	1.42	6.31
STEWART LAKES	1393	0.00	78.02	21.98	21.98	0.00	3.52	0.85	1.16	4.53
STEWART LAKES	*1394	0.30	99.60	0.10	---	---	0.89	0.59	1.64	30.74
STEWART LAKES	1395	0.00	100.00	0.00	---	---	1.82	0.44	0.20	4.96
STEWART LAKES	*1396	0.00	42.38	57.62	---	---	5.41	2.11	0.35	1.24
KOGALU - 1	1397	0.02	99.98	0.00	---	---	0.47	0.27	-0.80	8.90
KOGALU - 2	1398	0.10	99.90	0.00	---	---	0.61	0.41	-0.06	14.17
KOGALU - 3	1399	0.00	100.00	0.00	---	---	1.03	0.41	0.80	10.80
KOGALU - 4	1400	1.80	98.20	0.00	---	---	0.97	0.73	-2.74	17.43
KOGALU - 5	1401	0.10	99.90	0.00	---	---	0.91	0.35	-0.66	23.79
KOGALU - 6	1402	0.00	47.66	52.34	49.40	2.94	3.99	2.46	0.10	1.81
ITIRBILUNG	*1403	0.00	97.40	2.60	---	---	2.15	1.15	3.33	17.93
COUTTS INLET	*1404	2.70	96.10	1.20	---	---	1.57	1.13	0.38	19.99
POND INLET	1405	0.00	100.00	0.00	---	---	1.65	0.38	-0.47	3.78
CAPE HEWITT	*1406	0.00	97.82	2.18	---	---	1.65	1.09	4.12	25.04

TABLE 3 (continued)

1983 DELTA SURVEY G.S. (REVISED FROM TABLE 18.4 IN VOLUME 2)

SAMPLE	LAB ID	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KURT
CA-D #7	*2042	7.80	72.64	19.56	18.38	1.18	1.96	2.42	0.18	3.34
#8	*2043	0.60	98.50	0.90	---	---	1.18	1.01	2.47	21.22
#10	*2044	40.50	58.30	1.20	---	---	-0.51	1.90	0.83	6.15
#17	*2045	1.80	49.84	48.36	35.44	12.92	3.89	3.45	0.27	1.92
#22	*2046	1.70	91.02	7.28	7.00	0.28	1.59	1.51	0.82	6.22
#26	*2047	0.20	97.13	2.67	---	---	2.15	1.24	2.34	13.63
#27	*2048	59.60	39.70	0.70	---	---	-1.44	2.06	0.85	4.33
#28	*2049	1.20	98.41	0.40	---	---	0.64	1.01	1.40	15.05
#31	2050	0.32	79.99	19.69	17.86	1.83	2.35	1.97	1.41	4.57
#32	*2051	0.00	95.41	4.59	---	---	2.99	0.99	3.89	20.15
#33	*2052	1.70	94.54	3.76	---	---	1.11	1.70	2.31	10.70
#34	2053	0.10	30.51	69.39	53.79	15.61	5.47	2.30	0.37	3.07
#35	2054	0.00	90.10	9.90	8.50	1.40	2.96	1.20	3.14	17.36
	*2073	0.10	96.35	3.55	---	---	2.17	1.26	1.95	11.67
MC #1	2155	0.10	22.58	77.32	65.03	12.29	5.53	2.11	-0.11	3.11
#2	*2156	0.40	97.78	1.82	---	---	1.48	1.08	3.34	23.15
#3	*2157	0.20	98.98	0.82	---	---	0.78	0.95	3.24	25.64
PIT#3	2158	0.00	49.67	50.33	44.98	5.34	4.25	1.99	1.00	4.86
PIT#3	*2159	0.20	99.05	0.75	---	---	1.37	0.78	3.10	30.23
PIT#3	*2035	3.50	95.30	1.20	---	---	0.82	1.31	1.23	13.75
PIT#3	2036	0.00	90.54	9.46	7.97	1.49	3.06	1.21	3.37	21.21
#7	*2037	79.00	19.17	1.83	---	---	-2.15	2.21	2.17	9.10
#9	*2038	0.00	99.00	1.00	---	---	1.82	0.91	3.28	22.69
#11	*2039	0.00	99.40	0.61	---	---	1.92	0.70	2.39	19.09
#12	2040	0.00	1.44	98.56	50.13	48.43	8.02	1.93	0.06	2.70
#15	*2041	31.41	57.20	11.40	8.58	2.82	0.92	3.18	0.39	3.20
CA #1-1	2265	2.60	97.40	0.00	---	---	1.04	0.93	-1.72	10.60
#2-1	*2266	0.70	99.11	0.19	---	---	1.57	0.80	-1.19	9.77
#3-1	2267	6.40	93.60	0.00	---	---	0.76	1.16	-1.90	7.59
#4-1	2268	0.30	99.70	0.00	---	---	1.22	0.58	-0.65	12.25
#5-1	2269	1.20	98.80	0.00	---	---	1.00	0.78	-1.32	10.12
#6-1	2270	1.10	98.90	0.00	---	---	0.88	0.68	-1.70	13.48
#7-1	*2271	5.60	94.07	0.33	---	---	1.26	1.28	-1.92	7.41
b.c. - 2	*2272	26.60	73.16	0.24	---	---	0.04	2.05	-0.83	2.47
b.c. - 2	*2273	1.50	98.50	0.00	---	---	1.48	0.98	-1.16	8.23
b.c. - 2	*2274	18.50	79.43	2.07	---	---	0.89	2.20	-0.23	3.97
b.c. - 2	*2275	8.80	91.20	0.00	---	---	-0.02	1.09	-1.33	6.10
b.c. - 2	*2276	0.30	99.42	0.28	---	---	1.40	0.58	-0.35	15.60
b.c. - 2	2277	0.50	99.50	0.00	---	---	1.38	0.63	-1.28	15.96
b.c. - 2	*2278	8.20	89.83	1.97	---	---	1.25	1.72	-0.13	7.16
b.c. - 2	*2279	13.10	86.77	0.14	---	---	0.74	1.63	-1.30	4.01
b.c. - 2	*2280	38.90	60.98	0.12	---	---	-0.53	2.22	-0.41	1.70

TABLE 4

1983 MAG STUDY G.S. (REVISED FROM TABLE 19.4 IN VOLUME 2)

SAMPLE ID	GRAVEL %	SAND %	MUD %	SILT %	CLAY %	MEAN Ø	S.D. Ø	SK	KURT
2281	0.00	100.00	0.00	---	---	1.19	0.47	2.22	12.69
2282	0.00	100.00	0.00	---	---	1.01	0.43	1.86	13.57
2283	0.10	99.90	0.00	---	---	1.12	0.41	0.53	18.02
*2284	6.20	93.80	0.00	---	---	0.53	1.03	-2.39	8.92
*2285	0.30	99.53	0.17	---	---	0.78	0.52	0.50	20.69
*2286	6.00	94.00	0.00	---	---	-0.40	0.75	-2.34	8.90
*2287	2.90	96.96	0.14	---	---	0.47	0.72	-2.53	18.44
*2288	1.40	98.60	0.00	---	---	0.90	0.71	-2.02	15.31
*2289	14.40	85.60	0.00	---	---	0.31	1.47	-1.44	4.00
*2290	0.00	99.69	0.31	---	---	1.00	0.41	2.81	21.23
2291	1.20	98.80	0.00	---	---	0.89	0.63	-2.12	20.67
*2292	13.30	86.56	0.14	---	---	0.35	1.44	-1.43	4.25
2293	0.00	100.00	0.00	---	---	1.25	0.37	1.06	8.46
2294	0.30	99.70	0.00	---	---	0.77	0.57	0.12	11.36
2295	2.50	97.50	0.00	---	---	1.36	0.93	-2.44	13.36
*2296	1.40	98.42	0.18	---	---	0.99	0.80	-1.17	11.09
*2297	12.70	86.99	0.31	---	---	0.73	1.62	-1.28	4.00
2298	0.30	99.70	0.00	---	---	1.34	0.58	-0.51	13.13
2299	1.60	98.40	0.00	---	---	1.17	0.73	-2.78	18.09
*2300	0.00	99.77	0.23	---	---	1.72	0.42	0.27	8.28
*2301	1.20	98.58	0.22	---	---	1.23	0.75	-1.73	14.18
2302	0.60	99.40	0.00	---	---	1.50	0.70	-1.29	12.47
*2303	22.41	14.37	63.22	54.45	8.77	3.69	4.14	-0.66	1.90
*2304	0.40	99.12	0.48	---	---	1.82	0.84	-0.43	6.83
*2305	3.50	96.34	0.16	---	---	1.07	1.01	-2.16	9.95
*2306	0.00	100.00	0.00	---	---	0.96	0.50	0.34	3.91
Magnetite samples run using 5.18 specific gravity									
*2281	0.00	99.15	0.85	---	---	1.89	0.44	2.25	13.73
*2282	0.00	99.68	0.32	---	---	1.72	0.40	1.74	13.47
*2283	0.10	99.44	0.46	---	---	1.66	0.39	0.13	34.10
*2284	6.20	93.36	0.44	---	---	1.36	1.17	-3.05	12.14
*2288	1.40	98.21	0.39	---	---	1.83	0.73	-3.80	28.38
2289	14.40	85.60	0.00	---	---	1.18	1.75	-1.85	4.74
*2297	12.70	86.84	0.46	---	---	1.78	1.87	-1.99	5.43
2298	0.30	99.70	0.00	---	---	2.18	0.46	-3.98	48.15
*2299	1.60	98.11	0.29	---	---	1.86	0.78	-3.67	24.51
2300	0.00	100.00	0.00	---	---	2.23	0.36	-0.41	3.68
*2301	1.20	98.63	0.17	---	---	2.30	0.67	-5.76	46.46
*2302	0.60	98.54	0.86	---	---	2.27	0.56	-4.41	48.68
*2305	3.50	96.18	0.32	---	---	2.10	1.03	-4.21	21.53
*2306	0.00	99.87	0.13	---	---	1.66	0.48	0.24	4.18
Non-magnetic samples run using 2.65 specific gravity									
2283	0.10	99.90	0.00	---	---	1.16	0.43	0.98	18.71
*2284	6.20	93.80	0.00	---	---	0.49	1.05	-2.08	8.04
*2288	1.40	98.60	0.00	---	---	0.62	0.66	-1.93	16.29
*2289	14.40	85.60	0.00	---	---	-0.12	1.30	-1.34	3.65
*2297	12.70	87.30	0.00	---	---	0.71	1.59	-1.35	4.12
*2298	0.30	99.51	0.19	---	---	1.34	0.61	-0.21	11.58
2300	0.00	100.00	0.00	---	---	1.71	0.37	-0.59	5.80
*2301	1.20	98.64	0.16	---	---	1.13	0.87	-0.88	8.39
*2302	0.60	99.22	0.18	---	---	1.56	0.80	-0.88	8.87
*2305	3.50	96.50	0.00	---	---	1.07	1.09	-1.64	7.57